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A GENERAL DICTIONARY OF ARTS and SCIENCES.

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D, One of the letters of the alphabet, the fourth in order, and the third conſonant, anſwering to the Hebrew Daleth, and Greek Delta.

As a numeral, D denotes 500; and with a daſh over it thus, D̄, 5000. Uſed as an abbreviation, it has various ſignifications: thus, D. ſtands for doctor, as M. D. doctor of medicine; D. T. doctor of theology; D. D. implies doctor of divinity, or dono dedit; D. D. D. is uſed for dat, dicat, dedicat; and D. D. D. D. for dignum, Deo, donum, dedit.

DABAS, the name of cloths and woollen ſtuffs of the manufacture of Bas, in Languedoc.

DABUIS, a white cotton ſtuff, made in the Eaſt-Indies.

DACE, the Engliſh name of a ſpecies of cyprinus, very common in our rivers: it is longer and more ſlender than the roach, and has ten rays in the fin beſides the anus.

DACTYL, *δακτυλος*, *Dactylus*, in ancient poetry, a metrical foot, conſiſting of one long and two ſhort ſyllables, as *αλκιμος*, and mūrmŭrĕ.

The dactyl and ſpondee are the only feet or meaſures uſed in hexameter verſes; the former being eſteemed more ſprightly, and the latter more ſolemn and grave. Accordingly, where great activity is ſignified, we find the dactyls uſed with much propriety, as in the following verſes of Virgil.

Quadrupedante putrem ſonitu quatit ungula campum; and
Ferte citi ferrum, date tela, ſcandite muros.

DACTYLIC VERSES, in ancient poetry, hexameter verſes ending with a dactyl. See DACTYL and HEXAMETER.

DACTYLIS, in botany, a genus of plants, whoſe corolla is an acute, oblong, compreſſed glume, and contains three capillary filaments, topped with forked antheræ. It hath no pericarpium; but the ſeed, which is ſolitary, naked, depreſſed on one ſide, and convex on the other, is included in the corolla.

DACZAJIE, ſilver money current in Perſia, and worth five mamoudis. See the article MAMOUDI.

DADO, in architecture, the ſame with the dye. See the article DYE.

DÆMON, *Δαιμον*, a name given by the ancients to certain ſpirits, or genii, which appeared to men, either to do them ſervice, or to hurt them. The Platoniſts diſtinguiſh between gods, dæmons, and heroes. The gods are thoſe whom Cicero call *Dei majorum gentium*. The dæmons are thoſe whom we call angels. See ANGEL.

DÆMONIAC, a word applied to a perſon ſuppoſed to be poſſeſſed with an evil ſpirit, or dæmon.

DÆMONIACS, in church hiſtory, a branch of the Anabaptiſts, whoſe diſtinguiſhing tenet is, that the devils ſhall be ſaved at the end of the world.

DAFFODIL, in botany. See the article NARCISSUS.

DAFFODIL-LILLY. See the article AMARYLLIS and PANCRATIUM.

Sea-Daffodil. See Pancratium.

DAILY, the ſame with diurnal. See the article Diurnal.

DAIRY, among farmers, &c. a room or apartment where milk is kept, and manufactured into butter, cheeſe, &c.

The term is formed from *dey*, an old word for milk.

DAISY, *Bellis*, in botany, a genus of plants producing compound, radiated flowers. The florets which compoſe the diſk are hermaphrodite, and thoſe which form the rays are female. The ſeeds are ſolitary, ovated, compreſſed, and contained in the calyx.

From the common wild daiſy are produced ſeveral varieties with double flowers and different colours, which make a pretty appearance in gardens, and are very eaſily propagated by parting their roots in autumn.

The leaves of the common daiſy are reckoned vulnerary and diuretic.

DALECHAMPIA, in botany, a plant which grows naturally in Jamaica. Its root is compoſed of many fibres, from which ariſe ſeveral weak twining ſtalks, which faſten themſelves to the neighbouring plants: theſe are furniſhed at each joint with a trifoliate leaf. The flowers are produced from the ſide of the ſtalk, three or four growing upon a foot-ſtalk: ſome of theſe are male and others female; they are ſmall, and of an herbaceous colour. They have each a double involucrum, made up of two orders of leaves, which are narrow and armed with ſmall, briſtly, ſtinging hairs. The flowers are ſucceeded by a roundiſh, three-cornered capſule with three cells, each containing a roundiſh ſeed.

DAM, among lawyers, ſignifies a boundary or confinement.

Dam, or Dyke. See the article Dyke.

DAMA, the fallow-deer, in zoology, a ſpecies of the deer-kind, diſtinguiſhed by its ramoſe and compreſſed, or palmated horns.

DAMAGE, in law, in generally underſtood of a hurt, or hindrance attending a perſon's eſtate: but, in common law, it is a part of what the jurors are to enquire of in giving verdict for the plaintiff or defendant, in a civil action, whether real or perſonal; for after giving verdict on the principal cauſe, they are likewiſe aſked their conſciences, touching coſts and damages, which contain the hindrances that one party hath ſuffered from the wrong done him by the other. See the article Costs.

DAMARAS, an Indian taffeta, being a kind of armoiſin. See Armoisin.

DAMASK, a ſilk ſtuff, with a raiſed pattern, ſo as the right ſide of the damaſk is that which hath the flowers raiſed or ſattined.

Damask is alſo applied to a very fine ſteel, in ſome parts of the Levant, chiefly at Damaſcus in Syria; whence its name.

It is uſed for ſword and cutlaſs-blades, and is finely tempered. See Steel.

DAMASKEENING, or Damasking, the art or operation of beautifying iron, ſteel, &c. by making inciſions therein, and filling them up with gold and ſilver wire; chiefly uſed for adorning ſword-blades, guards and gripes, locks of piſtols, &c.

DAMELOPRE, a kind of bilander, uſed in Holland for conveying merchandiſe from one canal to another; being very commodious for paſſing under the bridges.

DAMIANISTS, in church hiſtory, a branch of the ancient Acephali ſeveritæ. They agreed with the catholics in admitting the IVth council, but diſowned any diſtinctions of perſons in the Godhead, and profeſſed one ſingle nature, incapable of any difference; and yet they called God, the Father, Son, and Holy Ghoſt.

DAMPS, in natural hiſtory, noxious ſteams and exhalations, frequently found in mines, pits, wells, and other ſubterraneous places.

DAMSON-Tree. See the article Prumus.

DAMNATA Terra, among chemiſts, the ſame with caput mortuum. See the article Caput.

DANCE, an agreeable motion of the body, adjuſted by art to the meaſures or tune of inſtruments, or of the voice.

DANCETTE, in heraldry, is when the outline of any bordure, or ordinary, is indented very largely, the largeneſs of the indentures being the only thing that diſtinguiſhes it from indented. See the article Indented.

DANCHE, in heraldry, the ſame with dentelle, according to Guillim: but Columbier makes it the ſame with indented.

DANDELION, *leontodon*, in botany, a plant whoſe flowers are compound and imbricated. The florets are monopetalous and ligulated, and contain five ſhort capillary ſtamina. The ſeed, which is ſolitary and oblong, is contained in the cup of each of the corollæ, and topped with down.

This plant grows naturally in fields; and is a very troubleſome weed in gardens.

In medicine, it is accounted an aperient and hepatic: and Boerhaave is of opinion, that when it is uſed for a conſiderable time, it will diſſolve almoſt all kinds of coagulations, and open the moſt obſtinate obſtructions of the viſcera.

When this plant is young, it is by many people eaten as a ſallad, and particularly among the French.

DANEGELT, a tax, or tribute, on every hide of land, impoſed on our anceſtors the Saxons by the Danes, on their frequent invaſions, as the arbitrary

trary terms of peace and departure. It was firſt impoſed as a continual yearly tax upon the whole nation, under king Ethelred. It was levied by William I. and II. but was releaſed by king Henry the Firſt; and finally aboliſhed by king Stephen.

DANK, a piece of ſilver current in Perſia, and ſome parts of Arabia, weighing the ſixteenth part of a drachm. It is alſo a weight uſed by the Arabians to weigh jewels and drugs.

DANTELLE, in heraldry, the ſame with dancette.

DAPHNE, in botany, a genus of plants, the flower of which conſiſts of a ſingle petal; the tube is cylindric, imperforated, and longer than the limb, which is divided into four oval, acute, plane, patent ſegments: the fruit is a roundiſh berry, containing one cell; the ſeed is ſingle, round, and fleſhy.

DAPIFER, the dignity or office of grand-maſter of a prince's houſhold. This title was given by the emperor of Conſtantinople to the czar of Ruſſia, as a teſtimony of favour. In France the like office was inſtituted by Charlemaign, under the title of dapiferat; and the dignity of dapifer is ſtill ſubſiſting in Germany, the elector of Bavaria aſſuming the title of arch-dapifer of the empire, whoſe office is, at the coronation of the emperor, to carry the firſt diſh of meat to table, on horſe-back.

DAPPLE BAY, in the manege; when bay horſes have marks of a dark bay, they are called dapple-bays.

DAPPLE-BLACK, when a black horſe has got ſpots or marks more black or ſhining than the reſt of his ſkin, he is called a dapple black.

DARAPTI, among logicians, one of the modes of ſyllogiſms of the third figure, whoſe premiſes are univerſal affirmatives, and the concluſion is a particular affirmative: thus,

> DAR- Every body is diviſible;
> AP- Every body is a ſubſtance;
> TI. Therefore, ſome ſubſtance is diviſible.

DARII, in logic, one of the modes of ſyllogiſms of the firſt figure, wherein the major propoſition is an univerſal affirmative, and the minor and concluſion particular affirmatives: thus,

> DA- Every thing that is moved, is moved by another.
> RI- Some body is moved:
> I. Therefore, ſome body is moved by another.

DARNEL, the Engliſh name of the lolium of botaniſts. See the article LOLIUM.

DART, in aſtronomy, geometry, &c. See the article SAGITTA.

DATA, among mathematicians, a term for ſuch things or quantities as are given or known, in order to find other things thereby that are unknown. Euclid uſes the word data, of which he hath a particular tract, for ſuch ſpaces, lines, and angles, as are given in magnitude, or to which we can aſſign others equal.

In algebra the given quantities, or data, are generally expreſſed by the firſt letters of the alphabet, and the unknown by the laſt letters; thus, if the problem be, From the ſum and product of two quantities given, to find the quantities themſelves, the quantities are repreſented by y and z; and $y + z = a$, the ſum given, and $yz = b$, the product given. See the article EQUATION.

DATA alſo expreſſes, in philoſophy and medicine, any quantity, which for the ſake of a preſent calculation is taken for granted to be ſuch, without requiring an immediate proof for its certainty, called alſo the given quantity, number, or power.

DATE, in law, is the deſcription of the day, month, year of our Lord, and year of the reign of the king, in which a deed or other writing was made. Anciently deeds had no dates but only of the month and year, and now, if in the date of any deed, the year of our Lord is right, though the year of the king's reign be wrong, it ſhall not hurt the ſame.

An antedate is a date prior to the real time when the inſtrument was paſſed.

DATE, the fruit of the phœnix, or great palm-tree. See PHOENIX.

DATISI, in logic, a mode of ſyllogiſms in the third figure, wherein the major is an univerſal affirmative, and the minor and concluſion particularly affirmative propoſitions. For example,

> DA- All who ſerve God are kings;
> TI- Some who ſerve God are poor;
> SI. Therefore ſome who are poor are kings.

DATIVE, among grammarians, the third caſe in the declenſion of nouns, expreſſing the relation of a thing to whoſe profit or loſs ſome other thing is referred. It is called dative, becauſe uſually governed by a verb, implying ſomething to be given to ſome perſon. In Engliſh, the dative is expreſſed by the ſigns *to* or *for*.

DATURA, thorn-apple, in botany, a genus of plants whoſe flower is monopetalous and funnel-ſhaped, with five ſubulated filaments, topped with oblong compreſſed antheræ. The fruit is an oval, bilocular, prickly capſule; and contains a number of kidney-ſhaped ſeeds. The common thorn-apple is annual, and grows to the height of two feet. The leaves are large, angular pointed, and of a deep colour, with a very offenſive fœtid ſmell.

It flowers in July and Auguſt: and is a poiſonous plant; taken inwardly, it cauſes vomiting, madneſs, convulſions, which are ſucceeded by death, if immediate help is wanting.

This genus is the ſame with the ſtramonium of Tournefort.

DAUCUS, carrot, in botany. See the article CARROT.

DAVIDISTS, in church hiſtory, a ſect of Chriſtian heretics in the ſixteenth century; ſo called from David George, their leader, who began by giving out that he was the Meſſiah, and was ſent into the world in order to people the kingdom of Heaven, which was quite empty of inhabitants, for want of virtuous and good men: he rejected marriage, and denied the reſurrection.

DAVIS's QUADRANT. See QUADRANT.

DAVIT, in naval affairs, a long beam of wood thruſt out acroſs from over the ſhip's fore-caſtle to draw up the flooks of the anchor clear from the ſhip's ſide.

The davit is occaſionally ſhifted to project over either ſide of the ſhip's fore-part, or, in the ſea-language, over either bow. Its inner end is ſecured by a ſtrong ring or link of iron, placed in the middle of the fore-caſtle, called the ſpan-ſhackle; and over the outer-end, which has a notch cut round it for that purpoſe, is hung a ſtrong block called the fiſh-block, through which is inſerted a rope called the fiſh-pendant, which being hooked to the flooks of the anchor, immediately draws them up by a tackle or complication of pullies, as ſoon as the anchor is catted. See the article CAT.

DAUPHIN, a title given to the eldeſt ſon of France, and heir preſumptive of the crown, on account of the province of Dauphiny, which, in 1343, was given to Philip of Valois, on this condition, by Humbert, dauphin of the Viennois.

DAY, according to the moſt natural and obvious ſenſe of the word, ſignifies that ſpace of time during which it continues to be light; in contradiſtinction to night, being that partition of time wherein it is dark; but the ſpace of time in which it is light, being ſomewhat vague and indeterminate, the time between the riſing and the ſetting of the ſun is uſually looked on as the day; and the time which lapſes from its ſetting to its riſing again, the night.

The word day is often taken in a large ſenſe, ſo as to include the night alſo; or to denote the time of a whole apparent revolution of the ſun round the earth, in which ſenſe it is called by ſome a natural day, and by others an artificial one: but to avoid confuſion, it is uſual to call it in the former ſenſe ſimply the day, and in the latter a nychthemeron, by which term that acceptation of it is aptly denoted, as it implies both day and night.

The nychthemeron is divided into twenty-four parts, called hours, which are of two ſorts, equal and unequal, or temporary. See the article HOUR.

Different nations begin their day at a different hour: thus the Egyptians began their day at midnight, from whom Hippocrates introduced that way of reckoning into aſtronomy, and Copernicus and others have followed him: but the greateſt part of aſtronomers reckon the day to begin at noon, and ſo count twenty-four hours, till the noon of the next day; and not twice twelve, according to the vulgar computation. The method of beginning the day at midnight prevails alſo in Great-Britain, France, Spain, and moſt parts of Europe.

The Babylonians began their day at ſun-riſing, reckoning the hour immediately before its riſing again the twenty-fourth hour of the day, from whence the hours reckoned in this way are called the Babylonic. In ſeveral parts of Germany, they begin their day at ſun-ſetting, and reckon on till it ſets next day, calling that the twenty-fourth hour: theſe are generally termed Italian hours. The Jews alſo began their nychthemeron at ſun-ſetting; but then they divided it into twice twelve hours, as we do, reckoning twelve for the day, be it long or ſhort, and twelve for the night; ſo that their hours continually varying with the day and night, the hours of the day were longer than that of the night, for one half year, and the contrary the other, from whence their hours are called temporary: thoſe at the time of the equinoxes became equal, becauſe then thoſe of the day and night are ſo. The Romans alſo reckoned their hours after this manner, as do the Turks at this day.

This kind of hours are called planetary, becauſe the ſeven planets were anciently looked upon as preſiding over the affairs of the world, and to take it by turns each of theſe hours, according to the following order: Saturn firſt, then Jupiter, Mars, the ſun, Venus, Mercury, and laſt of all the moon: hence they denominated each day of the week from that planet whoſe turn it was to preſide the firſt hour of the nychthemeron. Thus aſſigning the firſt hour of Saturday to Saturn, the ſecond will fall to Jupiter, the third to Mars, and ſo the twenty-ſecond of the ſame nychthemeron will fall to Saturn again, and therefore the twenty-third to Jupiter, and the laſt to Mars: ſo that on the firſt hour of the next day, it will fall to the ſun to preſide; and by the like manner of reckoning, the firſt hour of the next will fall to the moon; of the next, to Mars; of the next, to Mercury; of the next, to Venus: hence the days of the week came to be diſtinguiſhed by the Latin names of *Dies Saturni*, *Solis*, *Lunæ*, *Martis*, *Mercurii*, *Jovis*, and *Veneris*; and among us, by the names of Saturday, Sunday, Monday, &c.

DAY-LILLY, in botany. See the article HEMEROCALLIS.

DAYS *of Grace*, are thoſe granted by the court at the prayer of the defendent, or plaintiff, in whoſe delay it is.

DAYS *of Grace*, in commerce, are a cuſtomary number of days allowed for the payment of a bill of exchange, &c. after the ſame becomes due.

Three days of grace are allowed in England; ten in France and Dantzic; eight at Naples; ſix at Venice, Amſterdam, Rotterdam, and Antwerp;

four at Frankfort; five at Leipſic; twelve at Hamburgh; ſix in Portugal; fourteen in Spain; thirty in Genoa, &c.

DAYS MAN, in the north of England, an arbitrator or perſon choſen to determine an affair in diſpute.

Dog-DAYS, *Dies Caniculares* See the article CANICULAR *Days*.

Intercalary DAYS. See the article INTERCALARY *Days*.

DAY COAL, among miners, an appellation given to the upper ſtratum of the coal, or that which lies next the ſurface of the earth.

DEACON, διακονος, one of the three ſacred orders of the Chriſtian church. The word is ſometimes uſed in the New Teſtament for any one that miniſters in the ſervice of God, in which ſenſe biſhops and preſbyters are ſtiled deacons; but in its reſtrained ſenſe, it is taken for the third order of the clergy, as appears from the concurrent teſtimony of ancient writers, who conſtantly ſtile them miniſters of the myſteries of Chriſt, miniſters of epiſcopacy and the church, and the like. The firſt inſtitution of this order is recorded in Acts, chap. vi.

DEACONESS, a *Female Deacon*, an order of women, who had their diſtinct offices and ſervices in the primitive church.

DEAD, in general, ſomething void or deprived of life. See DEATH.

DEAD-EYES, in naval affairs, certain blocks with three holes in them, whereby to draw tight the ſhrouds and ſtays of a ſhip.

In order to form the purchaſe which tightens the ſhrouds, &c. there are always two of theſe dead-eyes placed at ſmall diſtances from each other, one in the end of the ſhroud, and the other to the ſhip's ſide, by a ſtrop or link of iron encompaſſing the edge of it; then a ſmaller rope, called the laniard, is paſſed alternately through the holes in the upper and lower dead-eyes, and drawn tight by the application of a tackle. See CHANNEL and CHAINS.

The dead-eyes uſed for the ſtays have only one hole in them, and are more uſually termed hearts.

There are likewiſe dead-eyes of another form uſed for the crow-feet: theſe are long, inclining to round, and tapering to one end. See CROW-FEET.

DEAD-LIGHT, amongſt ſeamen, a ſort of ſtrong wooden poſts, made exactly to fit the cabin-windows: they are always fixed in on any expectation of a ſtorm, and the glaſs windows taken out, which might otherwiſe be ſhattered to pieces by the ſea, and let great quantities of water pour into the ſhip.

DEAD-NETTLE, the Engliſh name for the lamium of botaniſts. See LAMIUM.

DEAD-RECKONING, in navigation, the judgment or eſtimation which is made of the place where a ſhip is, without any obſervation of the heavenly bodies; and is performed by keeping an account of her way by the log, in knowing the courſe they have ſteered by the compaſs, and by rectifying all the allowances for drift, lee-way, &c. according to the ſhip's known trim. This reckoning, however, is always to be corrected as often as any good obſervation can be obtained.

DEAD-RISING, or RISING-FLOOR, in ſhip-building, thoſe parts of a ſhip's floor afore and abaft, where it begins to riſe and grow narrower as it approaches the ſtem and ſtern-poſt.

DEAD-TOPS, a diſeaſe incident to young trees, cured by cutting off the dead parts cloſe to the next good twig or ſhoot, and claying them over, as in grafting. See the article GRAFTING.

DEAD-WATER, in the ſea language, the eddy of water which cloſes in with a ſhip's ſtern, as ſhe ſails through it.

DEADLY-CARROT, a plant called by botaniſts thapſia. See the article THAPSIA.

DEADLY-NIGHTSHADE, in botany. See the article ATROPA.

DEAFFORESTED, a term found in law-books, ſignifying that a place is diſcharged from being a foreſt, or freed from the foreſt-laws.

DEAFNESS, the ſtate of a perſon who either wants the ſenſe of hearing, or has it greatly impaired.

With regard to the cure, if the obſtruction be in the external cavity of the ear, it is diſcernible by the ſight. If there is occaſion to ſyringe the ear, a decoction of ſage and roſemary-flowers will be proper, with equal parts of water and white-wine: but great caution ſhould be uſed.

Hoffman ſays, deafneſs ſometimes ariſes from a ſlackneſs of the auditory nerves, which often happens from too great a humidity, which, if neglected, will terminate in a perpetual and incurable deafneſs, and may be diſperſed, if taken in time, by proper cephalics and ſudorifics.

Heiſter informs us, that medicinal waters drank in the ſummer-time pretty largely, are the beſt means as preſervatives, and for curing diſorders of the ears; and that they often perform more than any other remedies whatever.

DEAL, a thin kind of fir-planks, of great uſe in carpentry: they are formed by ſawing the trunk of a tree into a great many longitudinal diviſions, of more or leſs thickneſs, according to the purpoſes they are intended to ſerve.

Deals are rendered much harder, by throwing them into ſalt-water as ſoon as they are ſawed, keeping them there three or four days, and afterwards drying them in the air or ſun; but neither this, nor any other method yet known, will preſerve them from ſhrinking.

DEAN, an eccleſiaſtical dignity in cathedral and collegiate churches, and head of the chapter.

Rural DEAN, called alſo archpreſbyter, originally exerciſed juriſdiction over ten churches in the country, and afterwards became only the biſhop's ſubſtitute, to grant letters of adminiſtration, probate of wills, &c. to convocate the clergy, and ſignify to them ſometimes by letters, the biſhop's will, and to give induction for the archdeacon. Their office is now loſt in that of the archdeacons and chancellors.

DEAN *of a Monaſtery*, was a ſuperior eſtabliſhed under the abbot, to eaſe him in taking care of ten monks; whence he was called decanus.

DEAN *and* CHAPTER, are the biſhop's council to aſſiſt him in the affairs of religion, and to aſſent to every grant which the biſhop ſhall make to bind his ſucceſſors. As a deanery is a ſpiritual dignity, a man cannot be a dean and prebendary of the ſame church.

DEARTICULATION, the ſame with diarthroſis. See the article DIARTHROSIS.

DEATH, *Mors*, is generally conſidered as the ſeparation of the ſoul from the body; in which ſenſe it ſtands oppoſed to life, which conſiſts in the union thereof.

DEATH-WATCH, in zoology, an inſect nearly of the ſize of the common louſe, frequent among old wood, furniture, &c. It is of an oblong and flattiſh figure, and of a pale browniſh white colour; and the noiſe, reſembling the beating of a watch, is the love note of theſe animals, when the male or female woo each other.

DE BENE ESSE, a Latin phraſe uſed in our law in a doubtful meaning, as to take or do a thing *de bene eſſe*, is to allow it at preſent to be well done; but when it comes to be more fully examined, then to ſtand or fall, according to the merit of the thing.

DEBENTURE, a term of trade uſed at the cuſtom-houſe for a kind of certificate ſigned by the officers of the cuſtoms, which intitles a merchant exporting goods to the receipt of a bounty or drawback.

DEBENTURE, in ſome of the acts of parliament, denotes a kind of bond or bill firſt given in 1649, whereby the government is charged to pay the ſoldier creditor, or his aſſigns, the money due on auditing the account of his arrears.

DEBENTURE is likewiſe uſed in the exchequer, and given to the king's ſervants for the payment of their wages.

DEBET, among merchants, ſignifies the ſums due to them for goods ſold on credit, for which they have charged their journal or ledger. It is more particularly underſtood of the remainder of debts, part of which has been paid on account.

DEBET, among book-keepers, is uſed to expreſs the left-hand page of the ledger, to which are carried all articles ſupplied or paid on the ſubject of an account.

DEBILITY, among phyſicians, a relaxation of the ſolids, occaſioning oftentimes weakneſſes and faintings.

DEBRUIZED, in heraldry, a term peculiar to the Engliſh, by which is intimated the grievous reſtraint of any animal, debarred of its natural freedom, by any of the ordinaries being laid over it.

DEBT, *Debitum*, in law, any thing due to another, whether it be money, goods, or ſervices; or the action brought for recovering the ſame.

DEBTOR, a perſon who owes any thing to another, in contradiſtinction to creditor, which is he to whom the debt is owing.

DEBTOR, in merchant's accounts. See BOOK-KEEPING.

DECACHORDON, in antiquity, a muſical inſtrument with ten ſtrings, called by the Hebrews, haſur, being almoſt the ſame as our harp, of a triangular figure, with an hollow belly, and ſounding from the lower part.

DECAGYNIA, the name of an order, or ſubdiviſion in the Linnæan ſyſtem of botany, and comprehends ſuch flowers as have ten piſtils or ſtyles in each.

DECAGON, a plane figure in geometry, having ten ſides and ten angles; and if all the ſides are equal, and all the angles, it is called a regular decagon, and may be inſcribed in a circle.

The word is formed from the Greek, δεκα, ten, and γωνια, an angle.

The ſides of a regular decagon are, in power and length, equal to the greateſt ſegment of an hexagon inſcribed in the ſame circle, and cut in extreme and mean proportion.

DECALOGUE, the ten precepts or commandments delivered by God to Moſes, after engraving them on two tables of ſtone.

The word is Greek, δεκαλογος, and compounded of δεκα, ten, and λογος, a word.

The Jews, by way of excellence, call theſe commandments the ten words, from whence they had afterwards the name of decalogue.

DECAMPING, in military affairs, is the marching of an army from the ground where it before lay encamped. See CAMP.

DECANDRIA, the name of the tenth claſs in the Linnæan ſyſtem of botany; its characteriſtic is, that it conſiſts of ſuch plants as bear hermaphrodite flowers, furniſhed with ten ſtamina in each.

To this claſs belong ſaxifrage, dittany, arbutus, lychnis, and ſeveral others.

DECANTATION, among chemiſts, &c. the gently pouring off a liquor from its fæces, by inclining the lip, or canthus of the veſſel; whence the name.

DECANUS, in Roman antiquity, an officer who preſided over ten other officers, and was head of the contubernium, or ſerjeant of a file of ſoldiers.

DECAPITE, or DEFAIT, in heraldry. See the article DEFAIT.

DECASTYLE, in the ancient architecture, a building with an ordonance of ten columns in front, as the temple of Jupiter Olympius was.

DECEIT, *Dolus*, in law, a ſubtle trick, or device, to which may be added all manner of craft and colluſion, or underhand practice, uſed to defraud another, by any means whatever.

DECEMBER, in chronology, the laſt month of the year, conſiſting of thirty-one days, and ſo called, as being the tenth month in the Roman year, which commenced with March. See the articles Year and Month.

DECEMVIRI, in Roman antiquity, ten magiſtrates choſen annually at Rome, to govern the commonwealth inſtead of conſuls, with an abſolute power to draw up and make laws for the people.

There were alſo other decemviri, created on frequent emergencies, to manage and regulate certain affairs, as conducting colonies, preſiding at feaſts, taking care of ſacrifices, keeping the ſybils books, &c.

DECENNALIA, ancient Roman feſtivals celebrated by the emperors, every tenth year of their reign, with ſacrifices, games, and largeſſes for the people.

DECENNIERS, Deciners, or Doziners, in our ancient law, ſuch as had the overſight of ten friburghs, for the maintenance of the king's peace, the limits of whoſe juriſdiction was called decenna.

DECIDUOUS, an appellation chiefly uſed in reſpect to plants: thus, the calyx or cup of a flower is ſaid to be deciduous, when it falls along with the flower-petals; and, on the contrary, it is called permanent, when it remains after they are fallen. Again, deciduous leaves are thoſe which fall in autumn, in contradiſtinction to thoſe of ever-greens, which remain all the winter.

DECIL, in aſtronomy, an aſpect or poſition of two planets, when they are diſtant from each other a tenth part of the zodiac.

DECIMAL Arithmetic, the art of computing by decimal fractions, firſt invented by Johannes Regiomontanus, and uſed by him in the conſtruction of his tables of ſines.

Decimal Fractions are thoſe whoſe denominator is 1, with one or more cyphers; as, 10, 100, 1000, 10000, &c. Thus, $\frac{5}{10}$, $\frac{6}{100}$, $\frac{7}{1000}$, &c. are decimal fractions.

DECIMATION, a puniſhment inflicted by the Romans on ſuch ſoldiers as quitted their poſt, or behaved themſelves cowardly in the field. The names of all the guilty were put into an urn or helmet, and as many were drawn out as made the tenth part of the whole number, and theſe were put to the ſword, and the others ſaved.

DECIPHERING, the art of finding the alphabet of a cipher. See Cipher.

DECKS, in ſhip-building, the planked floors on which the guns reſt and the men walk: they are ſupported by the beams, and by two rows of ſmall pillars called ſtanchions, ſituated at proper diſtances from each other for the whole length of the ſhip. Firſt and ſecond rate ſhips, and the largeſt order of the third rate, are furniſhed with three decks, diſtinguiſhed by the names of the upper, middle, and lower-decks, the laſt of which is however commonly termed, abſurdly enough, the gun-deck: beſides theſe three, there is the quarter-deck and forecaſtle, which are on the ſame line, but are at ſome diſtance from each other, leaving a vacancy in the middle, which is called the waiſt. Above the hinder or aftmoſt part of the quarter-deck there is yet another deck, called the poop, which extends nearly over half of the quarter-deck, and forms a roof for the captain's cabbin, which is called the coach.

Fluſh-Deck, or a Deck *fluſh fore and aft*, is one laid from ſtem to ſtern, with one floor, without any heights or hollows, only the gradual riſing of the floor from the middle towards the two ends.

DECLAMATION, a ſpeech made in public, in the tone and manner of an oration, uniting the expreſſion of action to the propriety of pronunciation, in order to give the ſentiment its full impreſſion upon the mind.

DECLARATION, in law, is a formal ſhewing in writing the ground of complaint of the plaintiff, in an action againſt the defendant, where the plaintiff is ſuppoſed to have received ſome injury.

DECLENSION, in grammar, an inflexion of nouns, according to their divers caſes, as nominative, genitive, dative, &c. It is a different thing in the modern languages, which have not properly any caſes, from what it is in the ancient Greek and Latin.

DECLINATION, in aſtronomy, is the diſtance of any celeſtial object, or point in the heavens, from the celeſtial equinoctial, either north or ſouth, in degrees, minutes, &c. meaſured on a meridian, or circle of declination.

The greateſt declination of the ſun, or of the ecliptic, was firſt, as we know of, obſerved by Pytheas, at Maſtilia, about 324 years before Chriſt; who, obſerving that the height of a gnomon was to its ſhadow, when the ſun was in the meridian, as $31951\frac{1}{2}$ to 90000, from thence concluded the ſun's greateſt declination to be 23 deg. 52 min. 41 ſec. And Gaſſendus found the ſolſtitial ſhadow of the ſame length as it had been obſerved by Pytheas, near 2000 years before: and ſo he concluded that the ſun's greateſt declination is conſtant. But from a compariſon of the ſeveral obſervations concerning this matter, the ſun's greateſt declination is commonly accounted 23 deg. 30 min.

Declination *of the Sea-Compaſs*, or *Needle*, is its variation from the true meridian of any place.

Declination *of a Wall*, or *Plane of Dials*, is an arch of the horizon, contained either between the plane and the prime vertical circle, if you reckon it from the eaſt or weſt; or elſe between the meridian and the plane, if you account it from the north or ſouth.

DECLINATORIES, are inſtruments for taking the declinations, inclinations, and reclinations of planes; and they are of ſeveral kinds.

The beſt ſort for taking the declination conſiſts of a ſquare piece of braſs, or wood, with a limb accurately divided into degrees, and every fifth minute, if poſſible, having a horizontal dial moving on the center, made for the latitude of the place it is to ſerve in, and which has a ſmall bit of fine braſs fixed on its meridian line, like a fiducial edge, to cut the degrees of the limb; for at any time when the ſun ſhines, by having the hour of the day, you may find the declination of any wall or plane by this inſtrument.

DECLINING Dials, are thoſe whoſe planes ſtand perpendicularly to the horizon, and decline; that is, do not face directly the four cardinal points. See the article Dial.

DECLIVIS, in anatomy, a muſcle otherwiſe called obliquus deſcendens. See the article Obliquus.

DECLIVITY, denotes juſt the reverſe of acclivity. See Acclivity.

DECOCTION, in pharmacy, the boiling ſimples, or other drugs, in order to extract their virtues for ſome medicinal purpoſe.

DECOMPOSITE Leaf, one whoſe petiole is twice divided before it gives riſe to the leaf.

DECOMPOSITION, in chemiſtry and pharmacy, the reduction of a body into its principles or component parts. See the article Analysis.

DECORATION, in architecture, is uſed for whatever adorns a building, either without-ſide, or within. The orders of architecture contribute a great deal to the decoration; but then the ſeveral parts of theſe orders muſt have their juſt proportion, characters, and ornaments, otherwiſe the fineſt order will bring confuſion rather than richneſs.

DECORTICATION, the ſame with barking of trees. See Barking.

DECORUM, in architecture, is the ſuitableneſs of a building, and the ſeveral parts and ornaments thereof, to the ſtation and occaſion.

DECOUPLE, in heraldry, the ſame as uncoupled: thus, a chevron decouple, is a chevron wanting ſo much of it towards the point, that the two ends ſtand at a diſtance from one another, being parted and uncoupled.

DECOY. In a naval chace, it is uſual for ſmall ſhips of war to diſguiſe themſelves in ſuch a manner by painting, as to be miſtaken for merchantmen, or ſhips of the enemy, in order to deceive and provoke the adverſary to chaſe, at which time they are careful, by altering the trim of the ſhip, which is eaſily done, to prevent her from ſailing faſt, although at the ſame time they have a great ſail abroad, and appear extremely anxious to eſcape.

Decoy, a place made for catching wild fowl. Hence,

Decoy-Duck is a duck that flies abroad, and lights into company of wild ones, which by her allurements ſhe draws into the decoy.

DECREE, an order made by a ſuperior power for the regulation of an inferior.

Decree, in the civil law, is a determination that the emperor pronounces upon hearing a particular cauſe between the plaintiff and defendant.

Decrees *of Councils*, are the laws made by them, to regulate the doctrine and policy of the church.

Decrees *in Chancery*, are the determinations of the lord-chancellor, upon a full hearing of the merits of a cauſe.

DECREET, in the law of Scotland, a final decree or judgment of the lords of ſeſſion, from which an appeal only lies to parliament.

DECREMENT, in heraldry, ſignifies the wane of the moon from the full to the new.

DECREPITATION, in chemiſtry, the act of calcining ſalt over the fire, till it ceaſes to crackle. The deſign of this is to free the ſalt from ſuperfluous moiſture: but as it is thereby rendered porous, and apt to imbibe the humidity of the air, it muſt always be kept very cloſe afterwards, leſt the air ſhould moiſten it a-new.

Decrepitation is alſo applied to the crackling of the ſalts during the operation.

DECRETAL, in the canon-law, a letter of a pope, determining ſome point or queſtion in the eccleſiaſtical law. The decretals compoſe the ſecond part of the canon-law.

DECUPLE Proportion, that of ten to one. See the article Proportion.

DECURIO, in Roman antiquity, a commander of ten men in the army, or the chief of a decury.

DECURRENT Leaf, one which adheres immediately to the ſtalk of a plant, without any pedicle, and which has its lower part extended, and running a little way along the branch.

DECURY, ten perſons ranged under one chief, or leader, called the decurio.

DECUSSATION, a term in geometry, optics, and anatomy, ſignifying the croſſing of any two lines, rays, or nerves, when they meet in a point, and then go on ſeparately from one another.

DECUSSORIUM, a ſurgeon's inſtrument, which, by preſſing gently on the dura matter, cauſes an evacuation of the pus collected between the cranium and the before-mentioned membrane, through the perforation made by the trepan.

DEDICATION, a ſolemn devoting, or ſetting apart, any perſon or thing, to the ſervice of God, and the purpoſes of religion.

DEDICATION, in matters of literature, the inſcribing a book, poem, play, or the like, to ſome perſon of diſtinction, ſerving both as a protection and honour to them, and a mark of the author's reſpect for the perſon to whom he dedicates his work.

DEDUCTION, in commerce, a ſubtracting or retrenching a little ſum paid, from a greater remaining yet unpaid.

DEDUCTIONE, in muſic, a name given to the riſing of the voice, in pronouncing the ſyllables *ut*, *re*, *mi*, *fa*, *ſol*, *la*; *quia per has deducitur vox*; in contradiſtinction to reductio, when the voice deſcends by theſe, *la*, *ſol*, *fa*, *mi*, *re*, *ut*; *quia per has reducitur vox.*

DEED, an inſtrument written on paper or parchment, comprehending ſome contract, bargain, or agreement, between the parties thereto, in relation to the matter therein contained.

DEER, *Cervus*, in zoology. See the article CERVUS.

DEER-HAYS, large nets, made of cords, to catch deer. Whoever keeps them, except in his own park, forfeits forty ſhillings a month.

DEER-STEALERS are puniſhable by various laws and ſtatutes, made from time to time. Any offender convicted of deer-ſtealing, before a judge of goal delivery, may be tranſported by 5 Geo. I. cap. xxviii. And it is felony for perſons to appear armed and diſguiſed in a foreſt or park, and hunt or kill the deer, by 6 Geo. I. cap. xxii.

DE FACTO, ſomething actually in fact, or exiſting, in contradiſtinction to de jure, where a thing is only ſo in juſtice, but not in fact: as a king de facto is a perſon that is in actual poſſeſſion of a crown, but has no legal right to the ſame; and a king de jure is the perſon who has a juſt right to the crown, though he is out of poſſeſſion thereof.

DEFAMATION, the ſpeaking ſlanderous words of another; for which the ſlanderer is puniſhable, according to the nature of his offence, either by action upon the caſe at common law, or by ſtatute, or in the eccleſiaſtical court. No damages are given in the eccleſiaſtical court, but the puniſhment of the party is by way of penance.

DEFAULT, in law, is generally taken for non-appearance in court, at a day aſſigned; but imports any omiſſion of that which we ought to do, for which judgment may be given againſt the defaulter. In the uſual ſenſe, if the plaintiff in a ſuit make default in appearance on a trial, he will be nonſuited; and where a defendant makes default, judgment ſhould be had againſt him by default. Jurors making default in their appearance, are to loſe and forfeit iſſues.

DEFECTIVE, in general, an appellation given to things which want ſome of the properties that naturally they ought to have. Thus,

DEFECTIVE NOUNS are thoſe which want one of the numbers, or one or more caſes. See the article NOUN.

DEFECTIVE THIRD, among muſicians, the ſame with diminiſhed third. See the article DIMINISHED.

DEFEISANCE, or DEFEASANCE, in our law, a condition relating to ſome certain deed, which being performed, the deed is defeated and rendered void, as if it had never been made.

DEFENCE, in fortification, all ſorts of work that cover and defend the oppoſite poſts; as flanks, caſements, parapets, and fauſſebrays.

It is almoſt impoſſible to fix the miner to the face of a baſtion, till the defences of the oppoſite one are ruined, that is, till the parapet of its flank is beaten down, and the cannon, in all parts that can fire upon that face which is attacked, are diſmounted.

Line of DEFENCE, a ſuppoſed line drawn from the angle of the curtain, or from any other part in the curtain, to the flanked angle of the oppoſite baſtion. See the articles CURTAIN and BASTION.

A line of defence repreſents the flight of a muſket-ball from the place where the muſketeers ſtand, to ſcour the face of the baſtion, and ought never to exceed the reach of a muſket. It is either fichant or razant; the firſt is when it is drawn from the angle of the curtain to the flanked angle: the laſt, when it is drawn from a point in the curtain, razing the face of the baſtion.

DEFENCE, in law, ſignifies a plea, or what the defendant ought to make after the plaintiff's count, or declaration, viz. that he defends all the wrong, force, and damages, where and when he ought, &c.

DEFENCES, in heraldry, are the weapons of any beaſt, as the horns of a ſtag, the tuſks of a wild boar, &c.

DEFENDANT, in law, the perſon ſued in an action perſonal; as tenant is he who is ſued in an action real. See ACTION.

DEFENDER *of the Faith*, a peculiar title, belonging to the king of Great-Britain, as Catholic does to the king of Spain, Chriſtian to the king of France, &c.

This title was firſt given by pope Leo X. to king Henry VIII. for writing againſt Luther.

DEFENSITIVE, in ſurgery, ſignifies a bandage, plaſter, &c. to defend any part from external injuries.

DEFERENT, in anatomy, a term applied to certain veſſels in the body, that ſerve for the conveyance of humours from one part to another. See DEFERENTIA VASA.

DEFERENT, in the Ptolemaic aſtronomy, a circle invented to account for the eccentricity, perigee, and apogee of the planets.

DEFERENTIA VASA, two white, ſolid, flatted tubes, one lying on the right ſide, the other on the left, from the epididymis, of which they are continuations: each of them runs up in the cellular vagina of the ſpermatic veſſels, as high as the openings in the abdominal muſcles; the blood veſſels lying forward, and the vas deferens behind them.

Their uſe is to carry the ſemen from the epididymes to the veſiculæ ſeminales; and, in the coitus, to diſcharge it into the urethra.

DEFICIENT, in general, ſignifies much the ſame with defective. See DEFECTIVE.

DEFICIENT HYPERBOLA, one with only one aſymptote, and two hyperbolical legs running out infinitely towards the aſymptote, but contrary ways. See the article HYPERBOLA.

DEFICIENT INTERVAL, in muſic, one leſs by a comma than it ought to be. See COMMA and INTERVAL.

DEFICIENT NUMBERS, thoſe whoſe parts or multiples, added together, fall ſhort of the integer, whereof they are the parts; ſuch is 8, its parts, 1, 2, 4, making only 7. See the article NUMBER.

DEFILE, in fortification, a ſtraight narrow paſſage, through which a company of horſe or foot can paſs only in file, by making a ſmall front; ſo that the enemy may take an opportunity to ſtop their march, and to charge them with ſo much the more advantage, in regard that thoſe in the front and rear cannot reciprocally come to the relief of one another.

To DEFILE, is to reduce an army to a ſmall front, in order to march through a defile.

DEFILING *a Lodgment.* See ENFILADE.

DEFINITE, in grammar, is applied to an article that has a preciſe determinate ſignification; ſuch as the article *the* in Engliſh, *le* and *la* in French, &c. which fix and aſcertain the noun they belong to ſome particular, as *the king*, *le roy*; whereas in the quality *of king*, *de roy*, the articles *of* and *de* mark nothing preciſe, and are therefore indefinite.

DEFINITION, the ſhewing the meaning of one word by ſeveral other not ſynonymous terms.

DEFINITION, in rhetoric, is defined by Cicero, a ſhort comprehenſive explanation of a thing.

DEFLAGRATION, in chemiſtry, the kindling or ſetting fire to a ſalt, mineral, &c. either alone or mixed for that purpoſe, with a ſulphureous one, in order to purify it.

DEFLECTION *of the Rays of Light*, a property which Dr. Hook obſerved in 1675, and read an account of before the Royal Society, March 18, the ſame year. He ſays he found it different both from reflection and refraction, and that it was made towards the ſurface of the opaque body, perpendicularly.

This is the ſame property which Sir Iſaac Newton calls inflection. See the article INFLECTION.

DEFLUXION, in medicine, the falling of humours from a ſuperior to an inferior part of the body. See the articles CATARRH and PHTHISIS.

DEFLUXION *on the Eyes.* See the article EYES.

DEFORCEMENT, in law, the caſting any one out of his land, or with-holding of lands and tenements by force from the right owner.

DEFORMITY, the want of that uniformity neceſſary to conſtitute the beauty of an object.

DEFOSSION, BURYING ALIVE, a puniſhment which the Romans inflicted on ſuch of their veſtals as were guilty of incontinency.

DEFTERDAR, or DEFTARDAR, in the Turkiſh and Perſian polity, an officer of ſtate, anſwering to our lord-treaſurer, who appoints deputies in every province. See TREASURER.

DEGLUTITION, in medicine, the act of ſwallowing the food, performed by means of the tongue driving the aliment into the œſophagus, which, by the contraction of the ſphincter, protrudes the contents downwards.

DEGRADATION, the act of depriving a perſon for ever of a dignity or degree of honour, and taking away the title, badge, and privileges of it.

DEGRADATION, in painting, expreſſes the leſſening the appearance of diſtant objects in a landſcape, in the ſame manner as they would appear to an eye placed at that diſtance from them. See the articles PERSPECTIVE and LANDSCAPE.

DEGRADED CROSS, in heraldry, a croſs divided into ſteps at each end, diminiſhing as they aſcend towards the center, called by the French perronnée.

DEGREE, in geometry, a diviſion of a circle, including a three hundred and ſixtieth part of its circumference.

Every circle is ſuppoſed to be divided into three hundred and ſixty parts, called degrees, and each degree divided into ſixty other parts, called minutes; each of theſe minutes being again divided into ſixty ſeconds, each ſecond into thirds, and each third into fourths, and ſo on. See the articles MINUTE, SECOND, &c.

DEGREE *of Longitude.* See LONGITUDE.

DEGREE *of Latitude.* See the article LATITUDE.

A degree of the meridian on the ſurface of the globe is variouſly determined by various obſervers. Mr. Picart meaſured a degree in the latitude of 49° 21′, and found it equal to 57060 French toiſes. But the French mathematicians, who have lately examined Mr. Picart's operations, aſſure us, that the degree in that latitude is 57183 toiſes. Our countryman, Mr. Norwood, meaſured the diſtance between London and York, and found it 905751

Engliſh feet, or 69 Engliſh miles, 288 yards. Mr. Maupertuis meaſured a degree in Lapland, in the latitude of 66° 20′, and found it 57438 toiſes. A degree was likewiſe meaſured at the equator by other French mathematicians, and found to contain 56767.8 toiſes. Whence it appears, that the earth is not a ſphere, but an oblate ſpheroid. See the articles Earth, Spheroid, &c.

Degree, in the civil and canon law, denotes an interval in kinſhip, by which proximity and remoteneſs of blood are computed.

Degree, in chemiſtry, denotes the ſtate or intenſeneſs of fire. See Fire.

Degrees, in muſic, are the little intervals whereof the concords, or harmonical intervals, are compoſed.

Degree, in univerſities, denotes a quality conferred on the ſtudents or members thereof, as a teſtimony of their proficiency in the arts or ſciences, and intitling them to certain privileges.

DEHORS, in the military art, all ſorts of outworks placed at ſome diſtance from the walls of a fortification, the better to ſecure the main places, and to protract the ſiege, &c. See Crown-Work and Horn-Work.

DEIFICATION, in antiquity, the ſame with apotheoſis. See Apotheosis.

DEINCLINERS, or Deinclining Dials, are ſuch as both decline and incline, or recline at the ſame time. See the article Dial.

DEISM, the ſyſtem of religion acknowledged by the deiſts. See the next article.

DEISTS, in the modern ſenſe of the word, are thoſe perſons in Chriſtian countries, who acknowledging all the obligations and duties of natural religion, diſbelieve the Chriſtian ſcheme, or revealed religion. They are ſo called from their belief in God alone, in oppoſition to Chriſtians.

DEITY, a term frequently uſed in a ſynonymous ſenſe with God. See God.

DELEGATES, commiſſioners appointed by the king under the great ſeal to hear and determine appeals from the eccleſiaſtical court.

DELETERIOUS, an appellation given to things of a deſtructive or poiſonous nature. See Poison.

DELF denotes a quarry or mine, where either ſtone or coal is dug; but is more particularly uſed for the veins of coal lying under ground, before it is dug up. A delf, or delve of coals, alſo denotes a certain quantity when dug.

Delf, in heraldry, is by ſome ſuppoſed to repreſent a ſquare ſod or turf, and to be ſo called from delving, or digging.

DELIA, in antiquity, feaſts celebrated by the Athenians in honour of Apollo, ſurnamed Delius.

Delia was alſo a quinquennial feſtival in the iſland of Delos, inſtituted by Theſeus, at his return from Crete, in honour of Venus, whoſe ſtatue, given him by Ariadne, he erected on that place.

DELIAC, or Deliacal Problem, a problem much celebrated in the writings of the ancients, concerning the duplication of the cube. See the articles Duplication and Cube.

DELINEATION, or Delineating, the ſame with deſigning. See the article Designing.

DELINQUENT, a guilty perſon, or one who has committed ſome fault, or offence, for which he is puniſhable.

DELIQUIUM, in chemiſtry, ſignifies the ſolution of any body, when expoſed to a cool and damp place, by the humidity it attracts from the air. The ſalt of tartar diſſolved in the above manner is called oil of tartar per deliquium.

DELIRIUM, in phyſic, an incapacity in the organs of ſenſation to perform their functions in a proper manner, ſo that the mind does not reflect upon or judge of external objects as uſual.

The word is derived from the Latin, *deliro*, to rave, or talk idly.

This frequently happens in fevers, from too impetuous a motion of the blood, which ſo far alters the ſecretion of the brain, as to diſorder the whole nervous ſyſtem.

DELIVERY, in medicine, the bringing forth a perfect fœtus or child from its mother's womb.

DELPHINUM, lark-ſpur, in botany, a genus of plants whoſe flower conſiſts of five unequal petals, diſpoſed circularly: of theſe the upper one is anteriorly more obtuſe than the others, and is emarginated, and extended behind into a tubulated horn, which is ſtraight, long, and obtuſe. The two ſide petals are nearly of the ſize with the upper; and the two lower are leſs, and ſpread open. The ſtamina are numerous; and the fruit conſiſts of three capſules, of an ovate-ſubulated figure, joined together, which are filled with a number of angulated ſeeds.

There are ſeveral ſpecies of lark-ſpur; but the ſort which is well known, and common in gardens (particularly thoſe with double flowers of various colours) is much in eſteem, and extremely beautiful.

Theſe are annual, and may be ſown in autumn or ſpring. Where the land is light and dry, the autumn ſowing is to be preferred; for if the plants withſtand the ſeverity of winter, they blow much earlier than thoſe ſown in the ſpring, and their ſpikes of flowers are conſiderably larger. In order to continue their plenitude, all plants with ſingle flowers ſhould be deſtroyed ſo ſoon as they appear, reſerving for ſeed thoſe only which are very double.

They flower in July and Auguſt, and are great ornaments to the pleaſure garden.

DELPHINUS or Dolphin, in aſtronomy, a conſtellation of the northern hemiſphere, whoſe ſtars, according to Ptolemy and Tycho's catalogue, are 10; but in the Britiſh catalogue 18.

The ſtory concerning the dolphin's having a place in the heavens is various: ſome ſay, that Neptune, the god of the ſea, falling in love with Amphitrite, he deſired to marry her; but ſhe being very modeſt and ſhame-faced, hid herſelf from the ſea god, who ſent many meſſengers in ſearch of the beautiful nymph, among whom was the dolphin, who was ſo fortunate to find her; and by many perſuaſive arguments, perſuaded her to return and match with Neptune, for which piece of ſervice he was placed in heaven.

Others ſay, that when Bacchus had transformed the mariners that would have betrayed him into dolphins, he placed one of them in heaven, that it might be a warning for others to take heed how they carried any one out of their way, either contrary to his deſire, or their own promiſe.

Other poets again tell us a ſtory of one Arion, a lyric poet of Leſbos, who got great riches by his art, and as he was going to Italy, the mariners attempted to rob him; but he deſired he might be permitted to play one tune on his harp before they threw him into the ſea, where a dolphin, drawn thither by the ſweetneſs of the muſic, received him on his back, and carried him to Tenedos with all his money; for which kindneſs, according to Ovid, he was made a conſtellation, who expreſſes himſelf thus:

> The gods beheld the gen'rous deed, and Jove
> Advanced him from the deep to ſhine above
> Among the conſtellations, now divine;
> And for his ſhare of ſtars, he gave him nine.

Novidius referreth this conſtellation to the fiſh that ſaved Jonas from being drowned.

Order.	Magn.	Name.	Bayer Let.	Right Aſcenſion	Diſtance from Nor. Pole.	Var. in Right Aſcen.	Var. in Declination.
				° ′ ″	° ′ ″	″	″
1	6			304.41.21	79.53.58	41. 2	11. 5
2	3		ε	305.25.37	79.30.17	43.15	11.63
3	6		η	305.38. 1	77.47.28	41. 0	11. 7
4	5		ξ	306. 0.54	76. 9.12	40. 2	11. 8
5	6		ι	306.33.19	79.27.18	41. 2	11. 9
6	3		β	306.34.12	76.14.14	42.23	11.95
7	6		κ	306.50.50	80.45.35	42. 0	10. 0
8	6		θ	306.50.18	77.31.50	41. 0	10. 1
9	3		α	307.13.33	74.57.23	41.87	12.10
10	6			307.29.54	76.15.32	40. 4	12. 1
11	3.4		δ	308. 3.36	75.46.44	42. 9	12. 2
12	3.4		γ	308 52.25	74.43.37	41.91	12.59
13	5			308.57.43	84.51.40	43. 0	12. 6
14	6			309 29.17	83. 1.11	42. 2	12. 7
15	6			309.27.49	78.20.24	41. 0	12. 9
16	6			311. 0.42	78.20.28	41. 2	13. 0
17	6			311. 0.21	77.11. 9	41. 0	13. 1
18	6			311.40.53	80. 4. 4	40. 0	13. 4

DELTOIDES, in anatomy, a thick triangular muſcle of the arm, being one of the three elevators. See the article ELEVATOR.

This muſcle ariſes from the clavicle, and the acromion and ſpine of the ſcapula; and terminates at four fingers breadth below the neck of the humerus. See the article HUMERUS.

DELUGE, an inundation or overflowing of the earth, either wholly or in part, by water.

We have ſeveral deluges recorded in hiſtory, as that of Ogyges, which overflowed almoſt all Attica; and that of Deucalion, which drowned all Theſſaly in Greece; but the moſt terrible was that which is called the univerſal deluge, or Noah's flood, which overflowed and deſtroyed the whole earth, and out of which only Noah and thoſe with him in the ark eſcaped.

DELVIN, among the miners of Cornwall, a kind of ſlate more uſually called killas. See the article KILLAS.

DEMAIN, or DEMESNE, in its common acceptation, is uſed for the lands round a manor-houſe, occupied by the lord. See the article MANOR.

DEMAIN, or DEMESNE, in law, is commonly underſtood to be the lord's chief manor place, with the lands thereto belonging, which he and his anceſtors have time out of mind kept in their own manual occupation, for the maintenance of themſelves and their families. See the article MANOR.

DEMAIN denotes alſo all the parts of any manor not in the hands of freeholders.

DEMAND, in law, the calling upon a perſon for any thing that is due.

There are two kinds of demands, the one in deed, and the other in law. And theſe are again divided into three ſorts; one in writing, without ſpeaking, as in every writ of præcipe; one other without writing, being a verbal demand of the perſon who is to perform ſomething; and another made without either words or writing, which is termed a demand in law, as in caſes of entries on lands, &c. And as an entry upon land and taking diſtreſs for rent, are a demand in law of the land and rent, ſo the bringing an action of debt for money due on a bond, is a demand in law of the debt.

Debt and claims are to be demanded in time by the ſtatute of limitations, or they will be loſt by law.

DEMANDANT, in law, is the plaintiff in all real actions, wherein land, &c. is demanded; for theſe actions are by demands, as perſonal actions are by plaints.

DEMESNE, the ſame with demain. See DEMAIN.

DEMI, a word uſed in compoſition with other words to ſignify half. In words borrowed from the Latin we uſe ſemi. See the article SEMI.

DEMI-BASTION, a fortification having only one face and one flank. See the article BASTION.

DEMI-CANNON. See the article CANNON.

DEMI-CULVERIN. See alſo CANNON.

DEMI-GORGE, in fortification, half the gorge, or entrance into the baſtion, not taken directly from angle to angle, where the baſtion joins to the curtin; but from the angle of the flank to the center of the baſtion, or the angle the two curtins would make, where they protracted to meet in the baſtion. See BASTION and CURTIN.

DEMI-LUNE, a ſmall flanked baſtion, placed before the point of a baſtion when it is too weak. This work is alſo ſometimes placed before the curtin, when the moat is a little wider than it ought to be.

DEMI-QUAVER, a note in muſic, two of which are equal to a quaver. See the articles SEMI-QUAVER and QUAVER.

DEMI SEMI-QUAVER, in muſic, the ſhorteſt note, two of them being equal to a ſemi-quaver. See the articles SEMI-QUAVER, CHARACTER, &c.

DEMOCRACY, the ſame with a popular government, wherein the ſupreme power is lodged in the hands of the people: ſuch were Rome and Athens of old; but as to our modern republics, Baſil only excepted, their government comes nearer to ariſtocracy than democracy.

DEMOISELLE, in ornithology, a bird of the crane kind, ſomething leſs than a heron, known alſo by the name of the dancing bird, on account of its frequent leaping and turning round, and varying the motion of its head at the ſame time. Immediately from behind each eye, ſprings forth a tuft of long, ſoft, white feathers, which tend backwards in a very graceful manner, and wave with the leaſt air. The fore-part of the neck, on the contrary, is covered with ſoft, long, and ſlender black feathers, which fall on the breaſt in a very pleaſing manner, ſometimes cloſe, and at other times detached like a lady's tippet.

DEMONSTRABLE, a term uſed in the ſchools, to ſignify that a thing may be clearly proved. Thus it is demonſtrable, that the three angles of a triangle are equal to two right ones.

DEMONSTRATION, a method of reaſoning, whereby the mind clearly perceives the agreement or diſagreement between the ideas it conſiders. This knowledge, though it be certain, is not ſo clear and evident as intuitive knowledge. It requires pains and attention, and ſteady application of mind, to perceive the agreement or diſagreement it conſiders; and there muſt be a progreſſion by ſteps and degrees, before the mind in this way can arrive at certainty. Before demonſtration, there was a doubt, which in intuitive knowledge cannot happen to the mind that has its faculty of perception left to a degree capable of diſtinct ideas, no more than it can be a doubt to the eye that can diſtinctly ſee white and black, whether this ink and paper be all of a colour. In every ſtep that reaſon makes in a demonſtrative knowledge, there is an intuitive knowledge of that agreement or diſagreement it ſeeks with the next intermediate idea, which it uſes as a proof; for, if it were not ſo, that would yet need a proof, ſince, without the perception of ſuch agreement or diſagreement of the intermediate ideas, there is no knowledge produced. Each ſtep and progreſſion of the demonſtration muſt alſo be exactly carried in the mind, and a man muſt be ſure that no part is left out; which, becauſe, in long deductions, the memory cannot eaſily retain, this knowledge becomes more imperfect than intuitive, and men often embrace falſhoods for demonſtrations.

DEMONSTRATIVE, in rhetoric, one of the kinds of eloquence, viz. that which obtains in the compoſition of panegyrics, invectives, &c. See the article RHETORIC.

DEMONSTRATIVE, in grammar, a term given to ſuch pronouns as ſerve to indicate or point out a thing. Of this number are, *hic*, *hæc*, *hoc*, among the Latins; and *this*, *that*, *theſe*, *thoſe*, in Engliſh. See PRONOUN.

DEMULCENTS, among phyſicians, medicines good againſt acrimonious humours. Such are the roots of marſh-mallows, white lilies, of liquorice, and of viper-graſs, the five emollient herbs. See the article EMOLLIENT.

DEMURRAGE, in commerce, an allowance made to the maſter of a ſhip by the merchants, for ſtaying in a port longer than the time firſt appointed for his departure.

DEMURRER, in law, a ſtop put to any action upon ſome point of difficulty, which muſt be determined by the court, before any further proceedings can be had in the ſuit.

DEMURRER *to Evidence*, is where a queſtion of law ariſes thereon; as if the plaintiff in a ſuit gives in evidence any records, deeds, writings, &c. upon which a law-queſtion ariſes, and the defendant offers to demur upon it, then the plaintiff muſt join in ſuch demurrer, or wave his evidence.

DEMURRER *to Indictments*, is when a criminal joins iſſue upon a point of law in an indictment or appeal, allowing the fact as laid to be true. And if the indictment, or appeal, prove good in the opinion of the judges by whom the demurrer is to be tried, and not by the inqueſt, they proceed to judgment and execution, as if the party had been convicted by confeſſion or verdict.

DENARIUS, in Roman antiquity, the chief ſilver coin among the Romans, worth in our money about ſeven-pence three farthings. As a weight, it was the ſeventh part of a Roman ounce.

DENARIUS is alſo uſed in our law books for an Engliſh penny.

DENDRACHATES, in natural hiſtory, the name uſed by the ancients for an extremely elegant and beautiful ſpecies of agate, the ground of which is whitiſh, variegated with veins of a brighter white.

DENDRANATOMY, a term uſed by ſome for a deſcription of the various parts of trees, as, root, trunk, branch, bark, wood, pith, flower, fruit, &c.

The word is formed from the Greek, *δενδρος*, a a tree, *ανα*, and *τεμνω*, to diſſect.

DENTRITÆ, in natural hiſtory, a name given to thoſe ſpecies of ſeptariæ which have repreſentations of trees, &c.

DENEB, an Arabic term ſignifying tail, uſed by aſtronomers to denote ſeveral fixed ſtars. Thus deneb elecet, ſignifies the bright ſtar in the lion's tail. Deneb adigege, that in the ſwan's tail, &c.

DENIER, a ſmall French copper coin, of which twelve make a ſol.

DENIZEN, in law, an alien made a ſubject by the king's letters patent, otherwiſe called donaiſon, becauſe his legitimation proceeds *ex donatione regis*, from the king's gift.

DENOMINATION, a name impoſed on any thing, uſually expreſſing ſome predominant quality.

DENOMINATIVE Quality, that quality from which things take their denomination.

DENOMINATOR, in arithmetic, a term uſed in ſpeaking of fractions.

The denominator of a fraction is the number below the line, ſhewing into how many parts the integer is ſuppoſed to be divided. Thus in the fraction $\frac{3}{4}$, the number 4 ſhews that the integer is divided into four parts. So in the fraction $\frac{a}{b}$, b is the denominator. See the article Fraction.

Denominator of a ratio is the quotient ariſing from the diviſion of the antecedent by the conſequent. Thus 8 is the denominator of the ratio 40 : 5, becauſe 40 divided by 5, gives 8 for a quotient. It is alſo called the exponent of a ratio. See the article Exponent.

DENSHRING, or Devenshring, in huſbandry. See Devenshring.

DENSITY *of Bodies*, or fluids, in phyſics, is that property or habitude whereby they contain a certain quantity of matter under a certain bulk; accordingly, that body which contains more matter than another under the ſame bulk, is ſaid to be denſer than that other.

The laws of denſity, in general, are as follows:

1. Bodies of the ſame denſity contain equal maſſes under equal bulks.

2. If the bulks of two bodies are equal, their denſities are as their maſſes. Conſequently

3. The denſities of equal bodies are as their gravities.

4. If two bodies have the ſame denſity their maſſes are as their bulks.

5. The quantities of matter contained in any two bodies are in a ratio compounded of their denſity and bulk.

It will therefore follow, that their gravity is in the ſame ratio.

6. If the maſſes, or gravities of two bodies are equal, their denſities are reciprocally as their bulks.

7. The denſities of any two bodies are in a ratio compounded of the direct ratio of their maſſes, and a reciprocal one of their bulks. Conſequently,

8. Since the gravity of bodies is as their maſſes, their denſities are in a ratio compounded of the direct ratio of their gravities, and a reciprocal one of their bulks.

Note, The ſame properties, or laws of denſity are to be obſerved with regard to fluids of all kinds whatever.

DENTALIUM, in natural hiſtory, a ſimple ſhell having no hinge, and formed only of one piece: it is of a figure approaching to cylindric or conic, and is ſometimes crooked, ſometimes ſtraight; ſometimes cloſed at one end, ſometimes open at both: its animal inhabitant is called nereis.

DENTARIA, toothwort, in botany, a genus of plants, bearing cruciform flowers, each of which conſiſts of four obtuſe petals, with ſix ſtamina, two of which are ſhorter than the others. The fruit is a long, cylindrical, bilocular pod, opening with two valves, and includes a number of roundiſh ſeeds.

The root is the only part uſed in medicine, and is accounted drying and aſtringent.

DENTATED Leaf, among botaniſts, one notched at the edges with a number of blunt points, in ſome meaſure reſembling teeth.

DENTICLES, or Dentils, in architecture, an ornament in corniches, bearing ſome reſemblance to teeth, particularly uſed in the Ionic and Corinthian orders. They are cut on a little ſquare member, properly called denticulus, and the notches or ornaments themſelves, dentils. In the ancient times dentils were never uſed in the Ionic corniche, yet they are found in the remains of the theatre of Marcellus, which ſome take for an argument that Vitruvius had not the direction of that building. Vitruvius preſcribes the breadth of each dentil to be half its height, and the indentine or interval between each two, he directs to be two thirds of the breadth of the dentil.

DENTIFORM Process, in anatomy. See the article Pyrenoides.

DENTIFRICE, in medicine, a remedy for rubbing the teeth, and purging them from ſordes; and for cleanſing and abſterging the gums, when replete with humours. There are dentifrices of various kinds and forms, ſome in form of a powder compoſed of corals, pumice-ſtone, ſalt, alum, egg-ſhells, crabs-claws, hartſhorn, &c.

The generality of operators for the teeth allow acids, ſuch as ſpirit of ſalt, &c. to be the readieſt of all dentifrices, to take off the foulneſs and yellowneſs of the teeth: but yet they do not adviſe a frequent uſe of theſe remedies, as they wear away too much of the teeth, and injure the gums.

DENTILS, in architecture, the ſame with denticles. See the article Denticles.

DENTISCALPRA, in ſurgery, an inſtrument for ſcouring yellow, livid, or black teeth; to which being applied, near the gums, it ſcrapes off the foul morbid cruſt.

DENTITION, the breeding, or cutting the children.

DENUNCIATION, a ſolemn publication, or promulgation of any thing.

DEOBSTRUENTS, in pharmacy, ſuch medicines as open obſtructions. See the article Detergent.

DEODAND, in our cuſtoms, implies a thing devoted or conſecrated to God, for the pacification of his wrath, in caſe of any misfortune; as a perſon's coming to a violent end, without the fault of any reaſonable creature; as if a horſe ſhould ſtrike his keeper, and ſo kill him. In this caſe, the horſe is to be a deodand; that is, he is to be ſold, and the price diſtributed to the poor, as an expiation of that dreadful event.

DEPART, in chemiſtry, a method of refining, or ſeparating gold from ſilver, by means of aquafortis, generally called quartation.

DEPARTURE, in law, ſignifies a departing or going from a plea given in bar of an action. It is likewiſe uſed where a plaintiff in his declaration ſets forth one thing, and after the defendant has pleaded thereto, he in his replication ſhews new matter different from his declaration.

Departure, in navigation, is the eaſting or weſting of a ſhip, with regard to the meridian it departed or ſailed from; or it is the difference of longitude between the preſent meridian the ſhip is under, and that where the laſt reckoning or obſervation was made; and, in all places, except under the equator, it muſt be accounted according to the number of miles in a degree of the parallel the ſhip is in.

The departure, in plane and Mercator's ſailing, is always repreſented by the baſe of a right-angle triangle, where the courſe is the angle oppoſite to it, and the diſtance the hypothenuſe. In the plane and Mercator's chart, as radius to the diſtance, ſo is the ſine of the courſe to the departure.

But this is erroneous, except in very ſmall diſtances; for if the diſtance and difference of latitude be repreſented by the hypothenuſe and perpendicular of a right-angled plain triangle, the departure will not be the baſe of that triangle.

DEPHLEGMATED, an appellation given to ſpirits well freed from phlegm.

DEPHLEGMATION, in chemiſtry, the ſame as rectification, or the freeing a ſpirit from its phlegm, either by diſtillation, or ſome other means.

DEPILATORY Medicines, thoſe applied in order to take off the hair: ſuch are lime and orpiment known to be, but which ought to be uſed with great caution.

DEPONENT, in Latin grammar, a term applied to verbs which have active ſignifications, but paſſive terminations or conjugations, and want one of their participles paſſive.

Deponent, in law, a perſon who makes a depoſition. See the article Deposition.

DEPOPULATION, the act of committing waſte.

DEPOSITION, in law, the teſtimony given in court by a witneſs, upon oath.

DEPRECATION, in rhetoric, a figure whereby the orator invokes the aid and aſſiſtance of ſome one; or prays for ſome great evil or puniſhment to befal him who ſpeaks falſely, either himſelf or his adverſary.

DEPRECATORY, or Deprecative, in theology, a term applied to the manner of performing ſome ceremonies in the form of prayer.

DEPRESSION *of Equations*. See the article Equations.

Depression *of the Pole*. When a perſon ſails or travels towards the equator, he is ſaid to depreſs the pole, becauſe as many degrees as he aproaches nearer the equator, ſo many degrees will the pole be nearer the horizon. This phænomenon ariſes from the ſpherical figure of the earth.

DEPRESSOR, or Deprimens, in anatomy, a name applied to ſeveral muſcles, becauſe they depreſs the parts they are faſtened to.

Depressor Labii Superioris, or Triangularis, is a muſcle that ariſes from the lower edge of the under jaw, between the maſſeter and quadratus, and aſcends by the angle of the mouth to the upper-jaw. Theſe two muſcles acting together, expreſs a ſorrowful countenance, becauſe they draw downwards the corners of the mouth and cheeks.

Depressores Nasi, a pair of muſcles ariſing from the os maxillare, above the dentes inciſores; and are inſerted into the extremities of the alæ, which they pull downwards.

Depressor Anguli Oris, a name given by Albinus to the muſcle called by others depreſſor labiorum communis. See the article Depressor Labii.

Depressores Oculi, a pair of muſcles ſpringing from each corner of the eye, and anſwered by another pair of the like figure and ſtructure, in the lower eye-lid. See the article Eye.

DEPRIVATION, in the canon-law, the depoſing a biſhop, parſon, vicar, &c. from his office and preferment.

DEPTH, in geometry, the ſame with altitude; though, ſtrictly ſpeaking, we only uſe the term depth to denote how much one body, or part of a body, is below another.

Depth *of a Battalion or Squadron*, in military affairs, the number of ranks, or the quantity of men, of which each file conſiſts in a battalion or ſquadron.

The depth of the battalion is generally four men, and that of the ſquadron three.

So that if the battalion conſiſts of ſix hundred men, each rank will be one hundred and fifty.

The firſt rank is called the front of the battalion or ſquadron, and the laſt the rear. The files which bind it on the right and left are called the flanks.

DEPURATION, in pharmacy, is the ſeparating or freeing any fluid from all heterogeneous matter or feculencies, and thereby rendering every part of it of a ſimilar conſiſtence and appearance.

DEPURATORY Fever, a name given by Sydenham to a fever which prevailed much in the years 1661, 1662, 1663, and 1664. He called it depuratory, becauſe he obſerved that nature regulated all the ſymptoms in ſuch a manner, as to fit the febrile matter, prepared by proper concoction, for expulſion in a certain time, either by a copious ſweat, or a freer perſpiration.

DEPUTATION, a miſſion of ſelect perſons out of a company, or body, to a prince or aſſembly, to treat of matters in their name. They are more or leſs ſolemn, according to the quality of thoſe who ſend them, and the buſineſs they are ſent upon.

DERELICTS, in the civil law, ſuch goods as are wilfully relinquiſhed by the owner.

Derelict ſignifies alſo a thing forſaken, or caſt away by the ſea.

DERIVATION, in medicine, is when a humour, which cannot be conveniently evacuated at the part affected, is attracted from thence, and diſcharged at ſome more proper place in its vicinity; or is drawn from a noble to a more ignoble part, where it is leſs capable of doing injury. Thus a bliſter is applied upon the neck to draw thither the matter, in caſes of defluxions upon the eyes.

DERIVATIVE, in grammar, a word which is derived from another, called its primitive. See Primitive.

Thus manhood is derived from man, deity from deus, and lawyer from law.

DERVIS, a name given to all Mahometan monks, though of various orders.

DESART, a large extent of country entirely barren, and producing nothing. In this ſenſe ſome are ſandy deſarts, as thoſe of Lop, Xama, Arabia, and ſeveral others, in Aſia and Africa, thoſe of Lybia and Zara: others are ſtony, as the deſart of Pharan in Arabia Petrea.

The Desart, abſolutely ſo called, is that part of Arabia ſouth of the Holy Land, where the children of Iſrael wandered forty years.

DESCANT, in muſic, the art of compoſing in ſeveral parts. See Composition.

Deſcant is three-fold, viz. plain, figurative, and double.

Plain Descant is the ground-work and foundation of all muſical compoſitions, conſiſting altogether in the orderly placing of many concords, anſwering to ſimple counterpoint. See the article Counterpoint.

Figurative or *Florid* Descant, is that part of an air of muſic, wherein ſome diſcords are concerned, as well, though not ſo much, as concords. This may be termed the ornamental and rhetorical part of muſic, in regard that there are introduced all the varieties of points, ſyncopes, diverſities of meaſures, and whatever is capable of adorning the compoſition.

Descant *Double*, is when the parts are ſo contrived, that the treble, or any high part, may be made the baſs; and, on the contrary, the baſs the treble. See the articles Harmony, Counterpoint, and Melody.

DESCENDANT, in genealogy, a term relative to aſcendant, and applied to a perſon who is born or iſſued from ſome other referred to: thus, mankind are ſaid to be the deſcendants of Adam; and ſometimes the deſcendants of Noah.

DESCENSION, in aſtronomy, is either right or oblique.

The right deſcenſion of any celeſtial object, is that point of the equinoctial which ſets at the ſame time with that object in a right ſphere, reckoned from the firſt point of Aries.

The oblique deſcenſion is the ſame thing in an oblique ſphere.

DESCENSIONAL Difference, is the degrees and minutes, &c. reckoned on the equinoctial, between the two points deſcribed in the preceding article.

DESCENT, in general, is the tendency of a body from a higher to a lower place.

Descent of heavy bodies, is that uniform accelerated motion with which they tend towards the center of the earth. See the article Acceleration.

Descent, or Discent, in law, an order or method whereby lands or tenements are derived to any man from his anceſtors.

Descent, in heraldry, is uſed to expreſs the coming down of any thing from above: as, a lion en deſcent, is a lion with his head towards the baſe points, and his heel towards one of the corners of the chief, as if he were leaping down from ſome high place.

Descents, in fortification, are the holes, vaults, and hollow places made by undermining the ground.

The deſcent into the moat, or ditch, is a deep paſſage made through the eſplanade and covert-way, in form of a trench, whereof the upper-part is covered with madriers and clays, to ſecure the beſiegers from the enemy's fire. In wet ditches this trench is on a level with the ſurface of the water, but in dry ones it is ſunk as deep as the bottom of the ditch.

DESCRIBENT, in geometry, a line or ſurface, which by moving parallel to itſelf, deſcribes a ſurface or ſolid.

DESCRIPTION is ſuch a ſtrong and beautiful repreſentation of a thing, as gives the reader a diſtinct view and ſatisfactory notion of it.

DESERTER, in a military ſenſe, a ſoldier who, by running away from his regiment or company, abandons the ſervice.

DESHACHE, in heraldry, is where a beaſt has its limbs ſeparated from its body, ſo that they ſtill remain on the eſcutcheon, with only a ſmall ſeparation from their natural places.

DESIDERATUM is uſed to ſignify a deſirable perfection in any art or ſcience: thus, it is a deſideratum with the blackſmith, to render iron fuſible by a gentle heat, and yet preſerve it hard enough for ordinary uſes; with the glaſs-man and looking-glaſs maker, to render glaſs malleable; with the clock-maker, to bring pendulums to be uſeful, where there are irregular motions; with the brazier and copper-ſmith, to make malleable ſolder; with the ſhipwright, to build veſſels that will ſail under water; with the diver, to procure manageable inſtruments for conveying freſh air to the bottom of the ſea, ſufficient for reſpiration, and the burning of lights; with the aſſay-maſter, to melt or copel ores or metals immediately, without the uſe of bellows or furnaces; and with the carvers and joiners, to faſhion wood in moulds like plaſter of Paris, or burnt alabaſter, &c.

DESIGN, in a general ſenſe, the plan, order, repreſentation, or conſtruction of a building, book, painting, &c.

In building, the term ichnography may be uſed, when by deſign is only meant the plan of a building, or a flat figure drawn on paper: when ſome ſide or face of the building is raiſed from the ground, we may uſe the term orthography; and when both front and ſides are ſeen, in perſpective, we may call it ſcenography.

Design, in the manufactories, expreſſes the figures wherewith the workman enriches his ſtuff, or ſilk, and which he copies after ſome painter, or eminent draughtſman, as in diaper, damaſk, and other flowered ſilk and tapeſtry, and the like.

Design is alſo uſed, in painting, for the firſt idea of a large work, drawn roughly, and in little, with an intention to be executed and finiſhed in large. The art of painting has been by ſome of the greateſt maſters divided into the deſign, or draught, the proportion, the expreſſion, the claro-obſcuro, the ordonnance, the colouring, and the perſpective.

DESIGNING, the art of delineating or drawing the appearance of natural objects, by lines on a plane.

DESPOTICAL, in general, denotes any thing that is uncontrouled and abſolute; but is particularly uſed for an arbitrary government, where the power of the prince is unlimited, and his will a law to his ſubjects: ſuch are thoſe of Turky, Perſia, and moſt of the Eaſtern governments; and even thoſe of Europe, if we except the republics, England, and the Swediſh government.

DESPOUILLE, in heraldry, the whole caſe, ſkin, or ſlough of a beaſt, with the head, feet, tail, and all appurtenances, ſo that being filled and ſtuffed, it looks like the entire creature.

DESPUMATION, a term ſometimes uſed for the clarifying a liquor, by the ſkimming of its froth.

DESSERT, or Desart, a ſervice of fruits and ſweatmeats, uſually ſerved up laſt to table.

DESSICCATIVE, or Desciccative, in pharmacy, an epithet applied to ſuch topical medicines as dry up the humours flowing to a wound or ulcer.

DESTINY, among philoſophers and divines, the ſame with fate. See Fate.

DESUDATION, in medicine, a profuſe and inordinate ſweat, ſucceeded by an eruption of puſtulet, called ſudamina, or heat-pimples. See the articles Sudamina and Hidro.

DETACHED Pieces, in fortification, are ſuch out-works as are detached, or at a diſtance from the body of the place; as demilunes, ravelines, baſtions, &c. In painting, the figures are ſaid to be well detached, when they ſtand free and diſengaged from each other.

DETACHMENT, in military affairs, a certain number of ſoldiers drawn out from ſeveral regiments or companies equally, to be employed as the general thinks proper, whether on an attack, at a ſiege, or in parties to ſcour the country.

A detachment of two or three thouſand men, is a command for a brigadier; eight hundred for a colonel; four or five hundred for a lieutenant-colonel. A captain never marches on a detachment with leſs than fifty men, a lieutenant, an enſign, and two ſerjeants. A lieutenant is allowed thirty, and a ſerjeant; and a ſerjeant ten or twelve men. Detachments are ſometimes made of entire ſquadrons and battalions.

Detachment, in naval affairs, a certain number of ſhips choſen by an admiral or commodore from the reſt of the fleet or ſquadron, and appointed to execute ſome particular commiſſion.

DETENTS, in clock-work, are thoſe ſtops which, by being lifted up or let down, lock or unlock the clock in ſtriking. See the article Clock-Work.

Detent-Wheel, or Hoop-Wheel, in a

clock, that wheel which has a hoop almoſt round it, wherein there is a vacancy at which the clock locks.

DETERGENTS, *Detergentia*, in pharmacy, ſuch medicines as are not only ſoftening and adheſive, but alſo, by a peculiar activity, conjoined with a ſuitable configuration of parts, are apt to abrade, and carry along with them ſuch particles as they lay hold on in their paſſage.

DETERMINATE Problem, in geometry, that which has but one, or at leaſt a limited number of anſwers.

DETERMINATION, in mechanics, ſignifies much the ſame with the tendency or direction of a body in motion.

Determination, among ſchool-divines, is an act of divine power, limiting the agency of ſecond cauſes, in every inſtance, to what the Deity predeſtinated concerning them. See Predestination.

DESTINUE, in law, a writ or action that lies againſt one who has got goods or other things delivered to him to keep, and afterwards refuſes to deliver them.

Detinue *of Charters*. An action for detinue lies for deeds and charters which make the title to lands.

DETONATION, in chemiſtry, the noiſe and exploſion which any ſubſtance makes upon the application of fire to it. It is alſo called fulmination.

DETRAHENS Quadratus, in anatomy, a muſcle otherwiſe called platyſma. See the article Platysma.

DETRANCHE, in heraldry, a line bendwiſe, proceeding always from the dexter ſide, but not from the very angle, diagonally athwart the ſhield.

DEVENSHRING, or Denshring, a term uſed in many parts of England for burning of land. See Burning *of Land*.

DEVIATION, in the old aſtronomy, a circle invented to account for the excentricity and difference in the diſtance of the planets when in apogee and perigee.

In the Ptolemaic ſyſtem, it is called the deviation of the epicycle.

DEVIL, διαβολος, an evil angel, one of thoſe celeſtial ſpirits caſt down from heaven, for pretending to equal himſelf with God.

DEVISE, or Device, in heraldry, painting, and ſculpture, an emblem uſed to repreſent a certain family, perſon, action, or quality; with a ſuitable motto, applied in a figurative ſenſe. See Motto.

The eſſence of a deviſe conſiſts in the metaphorical ſimilitude between the things repreſenting and repreſented.

Devise is frequently alſo uſed for a cipher. See the article Cipher.

Devise, in law, the act whereby a perſon bequeaths his lands or tenements to another, by his laſt will and teſtament.

DEVOTION, *Devotio*, a ſincere ardent worſhip of the Deity.

Devotion, among the Romans, was a kind of ſacrifice, or ceremony, whereby they conſecrated themſelves to the ſervice of ſome perſon.

DEVOURING, in heraldry, is when fiſhes are borne in an eſcutcheon in a feeding poſture; for they ſwallow all the meat whole.

DEVUIDER, in the manege, is applied to a horſe that, upon working upon volts, makes his ſhoulders go too faſt for the croupe to follow; ſo that, inſtead of going upon two heads as he ought, he endeavours to go only upon one.

DEUNX, in Roman antiquity, eleven ounces, or $\frac{11}{12}$ parts of the Libra. See Libra.

DEUS, God, among divines and philoſophers. See the article God.

DEUTERO-Canonical, in theology, a term applied to certain books of Scripture which were added to the canon after the reſt; either becauſe they were not wrote till after the canon was compiled, or becauſe of ſome debate in regard to their canonicity.

DEUTERONOMY, a canonical book of the Old Teſtament, and the laſt of the pentateuch of Moſes.

This book was called Deuteronomy by the ſeventy Greek tranſlators, as being a recapitulation of the laws before delivered at large.

DEUTEROSIS, the Greek name by which the Jews called their miſchnah, or ſecond law.

DEW, a light, thin, inſenſible rain or miſt, falling on the earth while the ſun is below the horizon.

Sun Dew, in botany. See the article Drosera.

Dew-Berry, in botany. See the article Rubus.

DEXTANS, in Roman antiquity, ten ounces, or $\frac{10}{12}$ of their libra. See the article Libra.

DEXTER, in heraldry, an appellation given to whatever belongs to the right-ſide of a ſhield, or coat of arms: thus we ſay, bend-dexter, dexter-point, &c.

DEY, in matters of government, the ſovereign prince of Algiers, anſwering to the bey of Tunis.

DIABETES, from διαβαινω, to paſs off, in phyſic, that diſcharge of urine, when any liquor, ſoon after it is drank, is immoderately, and without undergoing almoſt any change, evacuated crude, and under the appearance of water.

In this diſorder the patient is continually afflicted with an inſatiable thirſt, that cannot be removed by drinking the moſt liberal draughts. The liquor drank is often diſcharged by urine, in larger quantities than it was taken into the ſtomach. Thus the whole body is, by this means, conſumed, and as it were diſſolved; though, in ſome patients, the loins, the thighs, the teſtes, and eſpecially the feet, become a little turgid, and a certain heat is perceived in the inteſtines.

A diabetes is a diſeaſe of the chronical kind, and depends upon the ſtate of the kidnies: when recent, it ſometimes admits of a cure; but when inveterate, and of long ſtanding, it becomes incurable.

According to Liſter, nothing more effectually contributes to the cure of this diſorder, than all preparations of almonds, and a milk diet; and he himſelf gives us an inſtance of one cured of it by drinking as much wine, boiled with ginger, as his ſtrength and condition would admit of; allowing him, at proper intervals, draughts of milk and water, to allay his thirſt.

According to Willis, few or none at all have been obſerved to be cured of a diabetes by aſtringents; and this practitioner, as he himſelf informs us, often preſcribed, with ſucceſs, the tincture of antimony, and a ſolution of quick-lime in water, together with ſaſſafras, aniſeeds, raiſins, and liquorice.

As to the cure of the diabetes by Briſtol waters, ſee the article BRISTOL *Water*.

DIACAUSTIC CURVE, is ſuppoſed to be generated in the following manner.

When the rays that iſſue from a radiated point are refracted by a given curve, ſo that the ſine of the angle contained by that refracted ray, and the perpendicular to the curve, is always to the ſine of the angle, contained by the incident ray, and that perpendicular in one conſtant ratio; the curve that touches all the refracted rays is called the diacauſtic curve, or cauſtic by refraction. Thus, let S (Plate XLI. *fig.* 4.) be the radiating point, SL any incident ray, LR the refracted ray, C the center of the curvature at L, CI perpendicular from C on the incident ray in I, CR perpendicular on the refracted ray in R; join SC and IR; let RZ perpendicular to RI meet CI in Z; join LZ meeting SC in Q, and let QM parallel to RZ meet the refracted ray LR in M: then ſhall M be in the cauſtic. For, ſuppoſing the refracted ray LR to touch the cauſtic in any point M, and LT parallel to CI to meet SC in T, and the point L in deſcribing the curve BL to move towards *l*; then the angular velocity of SI about S ſhall be to the angular velocity of MR about M in the ratio compounded of the direct ratio of the fluxion of CI to the fluxion of CR (or the ratio of CI or CR, by art. 27. of Maclaurin's fluxions, the ratio of CI the ſine of the angle of incidence to CR the ſine of the angle of refraction being ſuppoſed invariable) and of the inverſe ratio of SI to RM. The angular velocity of SL about S is to the angular velocity of ML about M (by art. 208, and 202, of the ſame book.) in the direct ratio of LI to LR (or of CZ to CR, becauſe the triangles CZR, LIR are ſimilar) and the inverſe ratio of SL to LM. Therefore LM is to RM as the rectangle contained by CI and SL is to the rectangle contained by SI and CZ, or (becauſe SI is to SL as CI is to LT) as LT is to CZ, or LQ to ZQ; conſequently, QM and ZR are parallel, and the point M was rightly determined. When the incident rays are parallel, let CB parallel to thoſe rays through the center of curvature meet LZ in Q, and QM parallel to RZ ſhall meet the refracted ray LR in the cauſtic at M. When the incident ray becomes perpendicular to the refracting curve, that is, when L comes to B, the angular velocity of SL is to the angular velocity of QL as QB is to SB; therefore the cauſtic meets SC in Q ſo that CQ is to BQ in the ratio compounded of the given ratio of CR (the ſine of refraction) to CI (the ſine of incidence) and of that of SC to SB: and when the incident rays are parallel, CQ is to BQ as the ſine of refraction is to the ſine of incidence.

Deſcribe the circle LICV upon the diameter LC, let CV parallel to the incident ray SI meet this circle in V; and RZ ſhall always paſs through V, the center of curvature C and incident ray SL being given. Therefore the point M is determined by applying CR in this circle, ſo that it may be to CI in the given ratio of the ſine of refraction to the ſine of incidence, joining VR that meets CI perpendicular from C to the incident ray in Z, joining LZ that meets SC in Q, and drawing QM parallel to VR. When LZ is parallel to SC, the refracted ray is the aſymptote of the cauſtic.

Let BL (*fig.* 5.) be a circle, and, the incident rays being ſuppoſed parallel, let the cauſtic touch the refracted ray LM in M, a point of the circle; then, becauſe LR is equal to RM, LQ and CI are biſected in Z and I: and, the triangles CRZ, LRI being ſimilar, it follows, that CZ, or one half of CI, is to CR as LI is to LR. Therefore, if the invariable ratio of the ſine of incidence to the ſine of refraction be expreſſed by that of I to R, the ſquare of I ſhall be to the ſquare of 2R as the ſquare of LI to the ſquare of LR, and 4RR—II ſhall be to II as the difference of the ſquares of LR and LI, or of CI and CR, is to the ſquare of LI; conſequently, 3RR is to II—RR as the ſquare of the radius CL is to the ſquare of LI, or CV: and in this manner Sir Iſaac Newton determines the poſition of the ray that, after a refraction at L, a reflexion at M, and a ſecond refraction at G, defines the interior rainbow; for, the rays incident about L being refracted ſo as to touch the cauſtic near to M, a point in the circle BLM, and being thence reflected, they will emerge nearly parallel at G. If it be required that the rays refracted about L (*fig.* 6.) ſhould be reflected at *l* in the circle nearly parallel to each other; then, by art. 411. MR muſt be equal to M*l*, or one half of LR, ZQ muſt be one half of LZ, CZ one half of ZI, and therefore equal to one third part of CI. But LI is to LR as CZ is to CR, or as I is to 3R, and 9RR—II is to II—RR as the ſquare of CI is to the ſquare of LI; therefore 8RR is to

II—RR as the ſquare of the radius CL is to the ſquare of LI, or CV; and hence the ray is determined which, after a refraction at L, two reflections at *l* and G, and a ſecond refraction at H, defines the exterior rainbow; for, if G *m* be one fourth part of GH, or of L*l*, the rays reflected at G ſhall touch a cauſtic formed by this ſecond reflexion at *m*, and emerge parallel after their refraction at H.

DIACELTATESSON, in chemiſtry, a name given by Van Helmont, to a purging preparation procured from the fixed flowers of antimony.

DIACENTROS, a term uſed by Kepler, for the leſſer diameter of a planet's orbit.

DIACHALCITIS, in ſurgery and pharmacy, a plaſter compoſed of oil, axungia, and chalcitis, which formerly uſed to be applied after the amputation of a cancer, and on many other occaſions.

DIACHYLON, in pharmacy, an emollient digeſtive plaſter, compoſed of the mucilages or juices of certain herbs, litharge, and oil.

The word is formed from the Greek, *δια* and *χυλος*, juice.

DIACODIUM, in pharmacy, a ſyrup prepared from the heads of poppies.

The word is formed from the Greek, *δια* and *κωδεια*, a poppy-head.

DIACOPE, in grammar, the ſame with tmeſis. See the article Tmesis.

DIACOUSTICS, or Diaphonics, is the doctrine, or conſideration of the properties of ſound, refracted in paſſing through different mediums; that is, out of a denſe into a more rare, or out of a rare into a denſer, medium. See Sound.

DIADELPHIA, the name of the ſeventeenth claſs in the Linnæan ſyſtem of botany; and comprehends all ſuch plants as bear hermaphrodite and papilionaceous flowers, and leguminous ſeed veſſels.

The diſtinguiſhing characteriſtic of this claſs, is that the corolla is unequal, and the petals are expreſt by diſtinct names. See the articles Vexillum, Ala, and Carina.

The filaments form two diſſimilar bodies: the lower one that involves the piſtil; and the upper one incumbent on it: the former of theſe, from the middle downwards, is cylindraceous, membranaceous, and ſplit lengthways on its upper ſide; but the upper half terminates in nine ſubulated parts, that are of the ſame length with, and follow the flexure of the carina of the corolla; and of which the intermediate or lower radii are longer by alternate pairs. The upper filament is ſingle and awl-ſhaped; and covers the ſlit of the cylindraceous part of the under one. The antheræ, reckoned together, are ten in number; one on the upper filament, and nine on the under. To this may be added, that the piſtil is ſingle, growing out of the recepticle within the calyx. The germen is oblong, roundiſh, and lightly compreſſed. The ſtyle is ſubulate, filiform, and aſcending of the ſame length and poſition of the radii of the filament: and the ſtigma is downy the length of the ſtyle from the part, turned upwards, and immediately below the antheræ.

This claſs is the moſt natural; the leaves are food for cattle, and the ſeeds for tame quadrupeds; and comprehends peas, beans, vetches, and a number of other genera.

DIADEM, in antiquity, a head-band, or fillet, worn by kings, as a badge of their royalty. It was made of ſilk, thread, or wool, and tied round the temples and forehead, the ends being tied behind, and let fall on the neck. It was uſually white, and quite plain, though ſometimes embroidered with gold, and ſet with pearls and precious ſtones. In latter times it came to be twiſted round crowns, laurels, &c. and even appears to have been worn on divers parts of the body. See Crown.

Diadem, in heraldry, is applied to certain circles, or rims, ſerving to incloſe the crowns of ſovereign princes, and to bear the globe and croſs, or the fleur de luces for their creſt. The crowns of kings are bound, ſome with a greater, and ſome with a leſs number of diadems. The bandage about the heads of Moors on ſhields is alſo called diadem, in blazoning.

DIADROME, in phyſics, the ſame with vibration, which ſee.

DIÆRESIS, in ſurgery, an operation ſerving to divide and ſeparate the part, when the continuity is a hindrance to the cure. Some profeſſors divide ſurgery into ſix parts, aſſigning to each Greek names, of which diæreſis is one.

Diæresis, in medicine, is the conſuming of the veſſels of an animal body, when from ſome corroding cauſe certain paſſages are made, which naturally ought to have been; or certain natural paſſages are dilated beyond their ordinary dimenſions, ſo that the humours which ought to have been contained in the veſſels extravaſate or run out.

Diæresis, in grammar, the diviſion of one ſyllable into two, which is uſually noted by two points over a letter, as aulaï inſtead of aulæ, diſſolüenda for diſſolvenda.

Diæresis, is alſo the ſame with what is otherwiſe called tmeſis. See Tmesis.

DIAGLYPHIC, the art of cutting or engraving figures on metals, ſuch as ſeals, intaglios, matrices of letters, &c. or coins for medals. See the articles Engraving and Sculpture.

DIAGNOSTIC, from the Greek *δια*, with or through, and *γινωσκω*, to know, is that judgment of a diſeaſe that is taken from the preſent ſymptoms and condition of the patient.

DIAGONAL, in geometry, a right-line drawn a-croſs a parallelogram, or other quadrilateral figure, from the vertex of one angle to that of another.

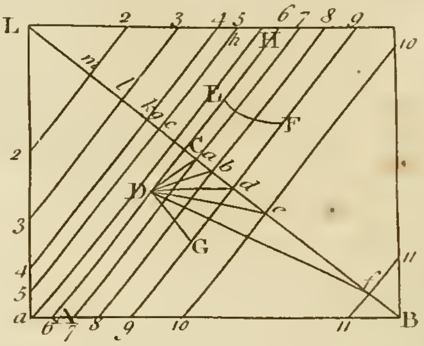


Fig. 3.

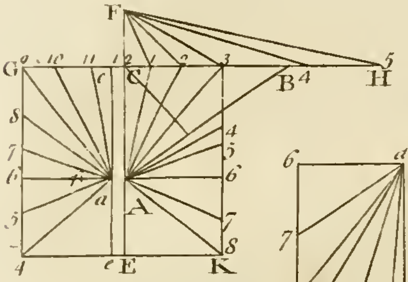


Fig. 1.

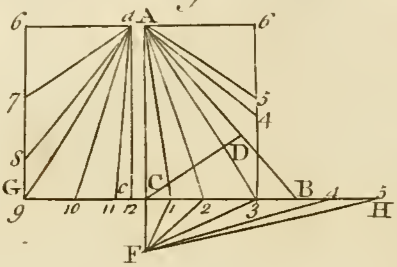
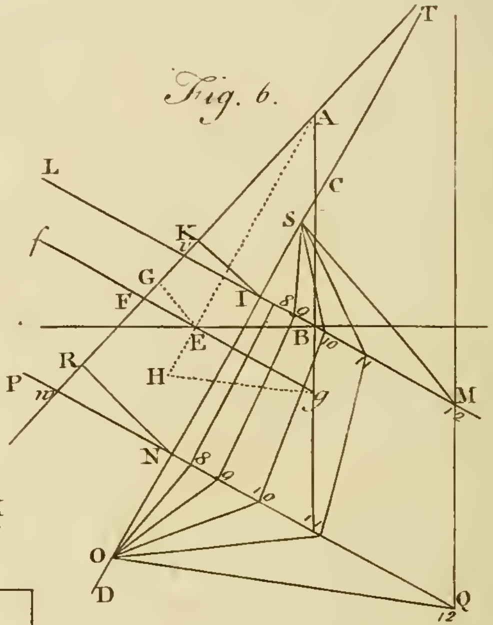


Fig. 2.



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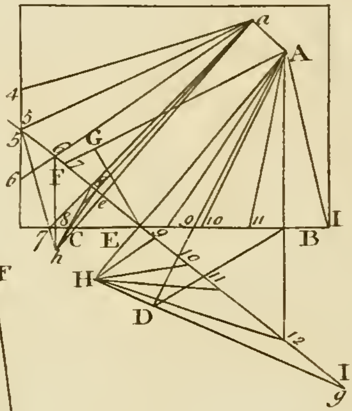


Fig. 5.

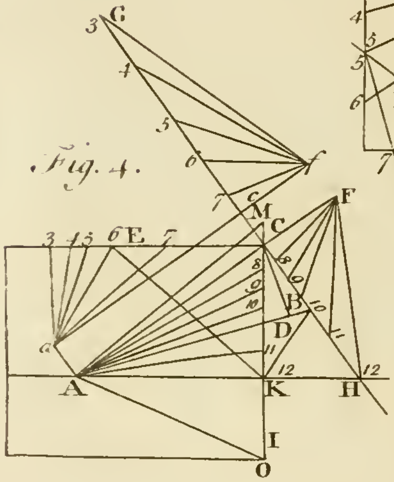


Fig. 4.

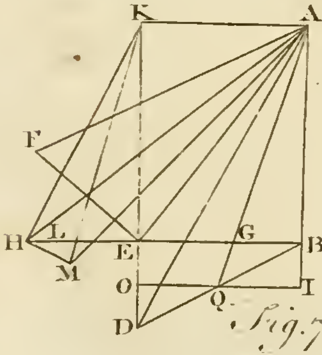


Fig. 7.

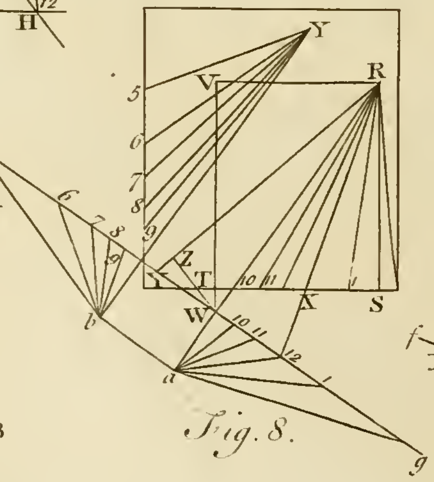


Fig. 8.

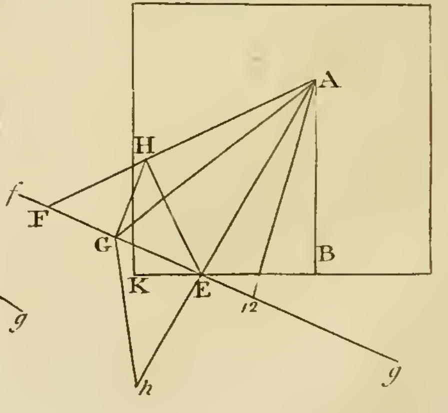


Fig. 9.

J. Lodge sculp

Such are the line A D or B C (Plate XLI. *fig.* 7.) drawn from the angles A and B to C and D.

Some authors call it diameter, and others the diametral of the figure.

It is demonſtrated, 1. that every diagonal divides a parallelogram into two equal parts: 2. two diagonals drawn in any parallelogram, biſſect each other: 3. the diagonal of a ſquare is incommenſurable with one of its ſides.

Add, 4. a very noble theorem in elementary geometry, firſt demonſtrated by Mr. Lagny, in the *Memoires de l'Académie Royale des Sciences, An.* 1706, is that the ſum of the ſquares of the two diagonals of every parallelogram, is equal to the ſum of the ſquares of the four ſides.

It is evident, at firſt ſight, that the famed 47th propoſition of Euclid, ſo richly worth the hecatomb it coſts its author, is only a particular caſe of this propoſition: for if the parallelogram be rectangled, it follows of courſe, that the two diagonals are equal; and, of conſequence, that the ſquare of a diagonal, or, which is the ſame thing, the ſquare of the hypothenuſe of a right angle, is equal to the ſquares of the two ſides. If a parallelogram be oblique-angled, and of conſequence, the two diagonals unequal, as is the more uſual caſe; the propoſition becomes of more extenſive uſe.

The demonſtration in oblique-angled parallelograms is thus: ſuppoſe the oblique-angled parallelogram A B C D, whereof B D is the greater diagonal, and A C the leſſer: from the point A, of the obtuſe angle D A B, let fall a perpendicular A E, to the ſide C D; and from the point B another perpendicular B F to the ſide D C. Then are the triangles A D E, B C F equal, and ſimilar, as A D is equal to B C, and the angle A D E, B C F, as well as A E D, B C F, are alſo equal; conſequently D E is equal to C F. Now, by Euclid, prop. 12. lib. 2. in the obtuſe-angled triangle B D C, the ſquare of the ſide B D is equal to the ſum of the ſquares of B C, and C D, and over and above, to double the rectangle of C F by C D; and by the 13th, lib. 2. in the triangle D A C, the ſquare of the ſide A C is equal to the ſum of the ſquares of A D, and C D, abating double the rectangle of the ſame C D, by D E, equal to C F. Conſequently, the former exceſs preciſely compenſating this defect; the ſum of the ſquares of the two diagonals is equal to the ſum of the ſquares of the four ſides. Q. E. D.

Hence, in every rhombus, or lozange, knowing one ſide, and a diagonal; the other diagonal will likewiſe be known: for as the four ſides are equal; ſubſtracting the ſquare of the given diagonal from quadruple the ſquare of the given ſide; the remainder is the ſquare of the diagonal required.

The propoſition is likewiſe of great uſe in the theory of compound motions: for in an oblique-angled parallelogram, the greater diagonal being the ſubtenſe of an obtuſe; and the leſſer, of an acute angle, which is the complement of the former; the greater will be the greater, and the leſs the leſs, as the obtuſe angle is the greater; ſo that if the obtuſe angle be conceived to grow till it be infinitely great with regard to the acute one, or, which amounts to the ſame thing, if the two contiguous ſides of the parallelogram be extended directly, end to end in a right line; the great diagonal becomes the ſum of the two ſides, and the leſſer one, nothing. Now, two contiguous ſides of a parallelogram being known, together with the angle they include, it is eaſy to find the ſubtenſe of that angle, *i. e.* one of the diagonals of the parallelogram, in numbers; which done, Mr. de Lagny's propoſition gives the other. Which ſecond diagonal thus found, is the line that would be deſcribed by a body impelled at the ſame time by two forces, which ſhould have the ſame ratio to each other, as the contiguous ſides have, and act in thoſe two directions; which diagonal the body would deſcribe in the ſame time, as it would have deſcribed either of the contiguous ſides in, if only impelled by the force correſponding thereto. This is one of the great uſes of the propoſition: for the ratio of two forces, and the angle they make, being given, it is frequently neceſſary to determine, in numbers, the line a body impelled by the two forces would deſcribe in a certain time.

DIAGRAM, in geometry, a ſcheme for explaining and demonſtrating the properties of any figure, whether triangle, ſquare, circle, &c. See the articles TRIANGLE, SQUARE, &c.

DIAGRAM, among ancient muſicians, the ſame with the ſcale of the moderns. See the article SCALE.

DIAGRADIUM, in pharmacy, a preparation of ſcammony, invented by Galen; it conſiſts in baking the ſcammony in a quince; but is at preſent ſeldom uſed.

DIAL, an inſtrument ſerving to meaſure time, by means of the ſhadow of the ſun.

DIALS are differently denominated, according to their different ſituation, and the figure of the ſurface whereon they are deſcribed, for the conſtructing of which obſerve the following definitions and problems.

DEFINITIONS.

1. A dial is a plane upon which lines are deſcribed in ſuch ſort, that the ſhadow of the upper edge of another plane, erected perpendicular thereto, may point out the hours of the day.

2. The edge of the ſaid plane, by which the hours of the day are marked out, is called the ſtyle of the dial, and is always parallel to the axis of the earth.

3. The Line in which the ſaid plane interſects the plane of the dial is called the ſubſtyle.

4. The angle included between the ſtyle and ſubſtyle is called the height of the ſtyle.

The poſition of any dial is diſtinguiſhed according as it is either parallel, perpendicular, or oblique, to the plane of the horizon of that place where it is fixed.

5. Thoſe dials, whoſe planes are parallel to the plane of the horizon, are called horizontal dials.

6. Thoſe dials, whoſe planes are perpendicular to the plane of the horizon, are called erect dials.

7. Thoſe erect dials, whoſe planes are either parallel or perpendicular to the plane of the meridian, are called direct erect dials; becauſe they front the four cardinal points.

8. All other erect dials are called declining dials.

9. Thoſe dials, whoſe planes are neither parallel nor perpendicular to the plane of the horizon, are called inclining or reclining dials.

10. Thoſe inclining or reclining dials, whoſe planes are either perpendicular to the meridian or prime vertical, are called direct inclining or reclining dials.

11. All thoſe oblique dials, whoſe planes make an obtuſe angle with the horizon, are called reclining dials; and thoſe, whoſe planes make an acute angle with the horizon, are called inclining dials.

12. The arch of the horizon, which is intercepted between any given plane and that of the prime vertical, is ſaid to be the declination of that plane.

13. The inclination of the plane is the angle which the plane makes with the horizon.

14. The reclination of the plane is the exceſs of the angle, which the plane makes with the horizon, above a right angle.

15. The interſection of the plane of the dial and that of the meridian, paſſing through the ſtyle, is called the meridian of the dial, or the hour-line of 12.

16. Thoſe meridians, paſſing through the ſtyle, which make angles of 15°, 30°, 45°, &c. with the meridian of the place (marking the hour-line of twelve) are called hour circles; and their interſections, with the plane of the dial, hour-lines.

17. The angle, formed by the ſubſtyle and the hour line of twelve, is called the diſtance of the ſubſtyle from the meridian.

18. The plane's difference of longitude is the angle formed at the ſtyle by two meridians; one paſſing through the hour-line of twelve, and the other through the ſubſtyle.

Problem I. To deſcribe an horizontal dial, geometrically, for any propoſed latitude.

Conſtruction. On the propoſed plane draw the right line 6 A 6, (Plate XLII. *fig.* 1.) for the eaſt and weſt line of the dial, or the hour-line of ſix; in the middle of which ſet off A *a* equal to the propoſed thickneſs of your ſtyle; through A, draw C A E, *c a e* both perpendicular to 6 A 6, and let G C H be parallel thereto; make the angle C A B equal to the given latitude, and upon A B let fall the perpendicular C D; in A C produced take C F equal to C D, then make the angles C F 1, C F 2, C F 3, &c. equal to 15°, 30°, 45°, &c. reſpectively, and draw A 1, A 2, A 3, &c. for the hour-lines of one, two, three, &c. after noon. Moreover, take *c* 11, *c* 10, *c* 9, &c. reſpectively, equal to C 1, C 2, C 3, &c. and draw *a* 11, *a* 10, *a* 9, &c. for the hour-lines of eleven, ten, nine, &c. before noon.

Note, The hour-lines of four and five, whoſe interſections G C H fall without the plane of the dial, may be otherwiſe drawn in the following manner. Take A *f* equal to the exceſs of A C above C D, and make the angles 6 *f* 5, 6 *f* 4 equal to 15°, 30° reſpectively, alſo from the points 4, 5, where the lines *f* 4, *f* 5 interſect K 3, parallel to C E, draw A 4, A 5 for the hour-lines of four and five; from which, by taking 6, 7, and 6, 8, equal to 6, 5, and 6, 4, &c. and drawing A 7, A 8, &c. you will alſo have the hour-lines of ſeven and eight.

For the line 6 A 6 being the eaſt and weſt line of the dial, the line C A E, perpendicular thereto, will therefore be the north and ſouth line with regard to the center A, or in reſpect of that ſide of the ſtyle, by the ſhadow of which the hours after noon are pointed out; and it is evident that, as A *a* expreſſes the thickneſs of the ſtyle, the line *c a e* will be the north and ſouth line of the dial, with regard to the center *a*, anſwering to the morning ſide of the ſtyle. Moreover, ſince the angle C A B is equal to the latitude of the place or the elevation of the pole, by conſtruction, it is evident, that when the ſtyle C A B is erected perpendicular to the plane of the horizon, on A *a c* C, the upper edge thereof will paſs through the pole of the world and ſo be parallel to the earth's axis.

Problem II. To deſcribe an erect ſouth dial, geometrically, for any given north latitude; or an erect north dial for any ſouth latitude.

Conſtruction. On the propoſed plane, draw the right line 6 A 6 (*fig.* 2.) for the eaſt and weſt line of the dial, or the hour-line of ſix; in the middle of which ſet off A *a* equal to the propoſed thickneſs of your ſtyle, and from A, *a* draw A C, *a c* both perpendicular to 6 A 6, alſo let G C H be parallel thereto: make the angle C A B equal to the complement of the latitude, and upon A B let fall the perpendicular C D, then proceed as in Prob. I.

To ſhew that the upper edge of the ſtyle, when the dial is placed in its proper poſition, will be parallel to the earth's axis (as it ought to be by Definition II.) we may obſerve, in the firſt place, that the line 6 A 6, being the eaſt and weſt line of the dial, and parallel to the plane of the horizon, the line A C perpendicular thereto (when the plane of the dial is erect, according to Definition VI.) will alſo be perpendicular to the horizon. Therefore when the plane of the ſtyle, repreſented by the triangle A C B, is erected perpendicular to the plane of the dial, on the line A C, it will coincide with the meridian (being perpendicular to the plane of the dial repreſented by the prime vertical:) and ſo the angle C B A being equal to the given latitude, or the elevation of the pole, (by conſtruction) it is evident A B the upper edge of the ſtyle, when produced, will paſs through the pole of the world, and ſo be parallel to the earth's axis.

Note, An erect north dial, for a north latitude, is conſtructed exactly in the ſame manner as an erect ſouth dial; the only difference being in the poſition of the dial: in the former caſe the line G B being made the upper edge of the dial inſtead of the lower.

The ſame may be obſerved with reſpect to an erect ſouth dial, for a ſouth latitude.

Problem III. To deſcribe an erect eaſt dial, geometrically, for any propoſed north latitude, or an erect weſt dial, for any ſouth latitude.

Conſtruction. On the propoſed plane draw the right line A B, (*fig.* 3.) for the horizontal line of the dial; make the angle L B A equal to the complement of the latitude, and, perpendicular to B L, draw A C H for the hour-line of ſix; take Cc equal to the propoſed thickneſs of your ſtyle, and parallel to A H draw ach; then having aſſumed D C at pleaſure, make the angles CDa, CDb, CDd, &c. equal to 15°, 30°, 45°, &c. reſpectively, and through the points a, b, d, &c. parallel to A C H, draw the lines $7a7$, $8b8$, $9d9$, &c. for the hour-lines of ſeven, eight, nine, &c. Moreover, take cg, ck, cl, &c. equal to Ca, Cb, Cd, &c. and through g, k, l, &c. parallel to ach, draw the lines $5g5$, $4k4$, $3l3$, &c. for the hour-lines of five, four, three, &c. The ſtyle in this caſe will be repreſented by the plane H 9 9 A, or DGFE, whoſe upper edge G F produced will paſs through the pole of the world (as it ought by Definition II.)

For the dial being placed in its proper poſition, the plane thereof will coincide with the meridian (by Definition VII.) and the line B A with the horizon; whence, the angle B A C being equal to the propoſed elevation of the pole by conſtruction, the line A C H will, it is evident, point directly to the ſaid pole, and therefore be parallel to the earth's axis. Therefore G F being parallel to A H, it muſt alſo be parallel to the earth's axis.

Note, An erect weſt dial for a north latitude, is conſtructed exactly in the ſame manner as an erect eaſt dial, provided that, inſtead of beginning the conſtruction from the right end B of the plane, you begin at the left end A, and that the figures expreſſing the hours of one, two, three, &c. in the afternoon be placed between the ſaid left end and the hour-line of ſix.

The ſame may be obſerved with regard to an erect eaſt dial for any ſouth latitude.

Problem V. To deſcribe a direct eaſt reclining dial, geometrically, for any north latitude; or a direct weſt reclining dial for any ſouth latitude.

Conſtruction, On the propoſed plane draw the right line I K 12, (*fig.* 4.) for the north and ſouth line of the dial, or the hour-line of twelve, perpendicular to which draw K C: make E C K equal to the given reclination, and perpendicular to K C draw C E L; take $KM = KE$ and make the angle A M K equal to the complement of the propoſed latitude; join A C, and perpendicular thereto draw G C H, in which ſet off Cc equal to the propoſed thickneſs of your ſtyle; through c draw ca perpendicular to G H, and let Aa be parallel thereto: make $CB = CF$, and joining A B, and K B, draw C D perpendicular to A B; in A C and ac, produced, take C F and cf, each equal to C D, and from F, to the point where G H interſects I K, draw F 12; then make the angles 12 F 11, 11 F 10, 10 F 9, 9 F 8, each equal to 15°, and the angle $cf7$ equal to the exceſs of 15° above the angle C F 8: alſo make the angles $7f6$, $6f5$, &c. each equal to 15°, and draw the right lines A 11, A 10, A 9, &c. for the hour-lines of 11, 10, 9, &c.

To ſhew that the upper edge of the ſtyle, when the dial is placed in its proper poſition, will be parallel to the earth's axis (as it ought to be by Definition II.) we may obſerve in the firſt place, that the plane of the triangle K E C, when erected perpendicular to the plane of the dial on the line K C, will be parallel to the prime vertical (by Definition X.) and perpendicular to the line I K, which, being the north and ſouth line of the dial, is parallel to the planes of the horizon and of the meridian, and therefore, becauſe the angle E K C expreſſes the reclination of the plane of the dial from the plane of the meridian, the line E K will be perpendicular to the plane of the horizon, and parallel to the plane of the meridian.

Now the triangles K E C, K B C, having the ſide $EC = BC$, K C common, and the angles E C K, B C K both right, will be equal and ſimilar; therefore when the plane of the ſtyle, repreſented by the triangle A C B, and the plane of the triangle K B C are erected perpendicular to the plane of the dial, on the lines A C, K C reſpectively, the triangle A K B, as the triangles K E C, K B C then coincide, will be parallel to the plane of the meridian. Moreover, becauſe $BK\ (= KE) = KM$, A K common, and the angles A K M, A K B both right, the triangles A K M, A K B will be equal and ſimilar, and therefore $ABK = AMK =$ the complement of the given latitude by conſtruction; conſequently, the angle K A B being equal to the given latitude, the upper edge of the ſtyle A B, when produced, will paſs through the pole of the world, and ſo be parallel to the earth's axis.

If it be required to deſcribe a weſt reclining dial for a north latitude, or an eaſt reclining one for a ſouth latitude, the method of conſtruction will ſtill be the ſame; provided that, inſtead of beginning the operation towards the right end of the line I K, you begin towards the left end, and that the figures expreſſing the hours after noon be placed, inſtead of thoſe expreſſing the hours before noon.

A direct weſt inclining dial, for a north latitude, is conſtructed in the ſame manner as a direct eaſt reclining one, only that the points A and C change their poſition (A being placed, in this caſe, at the left end of the line L C, and C at the right end of the line I K) and that (the ſun not coming on the plane till after noon) the figures expreſſing the hours after noon be placed inſtead of thoſe before noon.

The ſame may be obſerved with regard to a direct eaſt inclining dial for a ſouth latitude.

Problem VI. To deſcribe an erect ſouth dial, geometrically, for any propoſed north latitude, to have a given declination from weſt; or an erect north dial, for a ſouth latitude, to decline from the eaſt.

Conſtruction. On the propoſed plane draw the right line B C, (*fig.* 5.) for the horizontal line of the dial, and perpendicular thereto draw B A; make the angle B C A equal to the propoſed latitude, and the angle C B D equal to the complement of the given declination; then, having taken B D equal to B C, draw D E perpendicular to B C: join A E, and perpendicular thereto draw *f* E *g*, in which ſet off E *e* equal to the propoſed thickneſs of your ſtyle; through *e* draw *e a* perpendicular to *f g*, and let A *a* be parallel thereto: make EF equal to ED, and joining A F, draw E G perpendicular thereto; in A E and *a e* produced take E H and *e h* each equal to E G, and from H to the point where *f g* interſects A B, produced, draw H 12; then make the angles 12 H 11, 11 H 10, 10 H 9, each equal to 15 degrees, and the angle *e h* 8 equal to the exceſs of 15 degrees above the angle E H 9: alſo make the angles 8 *h* 7, 7 *h* 6, 6 *h* 5, &c. each equal to 15 degrees, and draw the right lines A 11, A 10, A 9, *a* 8, *a* 7, &c. for the hour-lines of 11, 10, 9, 8, &c.

To demonſtrate that the upper edge of the ſtyle, when the dial is placed in its proper poſition, will be parallel to the earth's axis (as it ought to be by Definition II.) it may be obſerved that the line B C being parallel to the plane of the horizon, the line A B perpendicular thereto, as the dial is an erect one, will be perpendicular to the ſaid plane; therefore the plane of the triangle B D E, when erected perpendicular to the plane of the dial, on the line B E, being perpendicular to the line A B, and parallel to the plane of the horizon, the line B D will be perpendicular to the plane of the prime vertical (becauſe the angle D B E expreſſes the complement of the plane's declination from the ſaid plane, by Definition XII.) and conſequently parallel to the plane of the meridian; therefore the plane A D B, being alſo perpendicular to the plane of the prime vertical, muſt coincide with the plane of the meridian.

Moreover, ſince D B is equal to B C (by Conſtruction) the angles A B D and A B C both right ones, and A B common, it is evident, that the angle A D B is equal to the angle A C B, equal to the given latitude, and conſequently that the line D A will be parallel to the earth's axis.

But the triangle A E F, when the plane of the ſtyle, repreſented by the triangle A F E, is erected perpendicular to that of the dial, on the ſubſtyle A E, will coincide with the triangle A D E, becauſe D E is equal to F E, A E common, and the angles A F E, A E D both right.

If it be required to deſcribe an erect ſouth dial for a northern latitude, to decline weſterly, or an erect north dial for a ſouthern latitude, to decline eaſterly; the method of conſtruction will ſtill be the ſame, only, inſtead of beginning the operation on the left ſide of A B, you muſt begin on the right ſide.

If the plane of an erect ſouth dial, declining eaſterly, in a northern latitude, be inverted, the dial will then become an erect north dial, declining weſterly, for the ſame latitude; and if the plane of an erect north dial declining weſterly, in a ſouthern latitude, be inverted, the dial will then become an erect ſouth dial, declining eaſterly, for the ſame latitude.

In like manner, an erect ſouth dial, declining weſterly, in a northern latitude, will become an erect north dial declining eaſterly; and an erect north dial, declining eaſterly, in a ſouthern latitude, will become an erect ſouth dial, declining weſterly.

If the declination be very great, ſo that the elevation of the ſtyle, above the ſubſtyle, becomes very ſmall, the preceding method of conſtruction will be impracticable; becauſe the hour-lines, particularly thoſe which fall near the ſubſtyle, unleſs they be continued to a great diſtance from the center of the dial, nearly coincide: which inconvenience may be removed by the following manner of conſtruction.

Having drawn the ſtyle A F and the ſubſtyle A E, as is taught above, let the line E G, (*fig.* 6.) be drawn perpendicular to A F, and in A E continued, let E H be taken equal to E G; then, having drawn *f* E *g* perpendicular to A E, produce A B to meet *f g* in *g*, and join H *g*. Moreover, at a convenient diſtance, let the line C D be drawn parallel to A E, for a new ſubſtyle, and the lines L M, P Q, at as great a diſtance from each other as room will permit, perpendicular thereto; alſo from the points I N, where the lines L M, P Q interſect C D, let I K, N R be drawn perpendicular to A F.

Make I S equal to I K and N O equal to N R; alſo make the angles I S M, N O Q each equal to the angle E H *g*; then, if the angles Q O 11, M S 11, 11 O 10, 11 S 10, 11 O 9, 10 S 9, &c. be each made equal to 15 degrees, lines drawn through the points M, 11, 10, 9, &c. Q, 11, 10, 9, &c. reſpectively, will be the hour-lines of the dial.

For, if from T, the point where F A and D C continued, meet, a line be drawn through M to meet P Q in 12, the triangles T I K, T N R, and T I M, T N 12, will be reſpectively ſimilar; and therefore I M : N 12 : : I K : N R : : I S : N O: But I M : N Q : : I S : N O, by conſtruction, therefore N 12 = N Q, conſequently the line Q M, continued, will paſs through T. In like manner it may be proved that the other hour-lines will paſs through T, the center of the dial; the ſtyle being here repreſented by the trapezium I *vw* N.

Problem VII. To deſcribe an eaſt declining dial, geometrically, for any propoſed northern latitude, to have a given reclination from the ſouth; or a weſt declining dial, for a ſouthern latitude, to have a given reclination from the north.

Conſtruction. Having drawn the ſtyle A F and the ſubſtyle A E (*fig.* 7.) anſwering to the given declination, according to problem vi. complete the parallelogram A B E K, and in B E produced take E H = E F = E D; alſo join K, H and make the angle EKL equal to the given reclination. On K L, produced, let fall the perpendicular H M and taking E O equal to E L, draw O I, parallel to E B, interſecting B D in Q.

On the propoſed plane (*fig.* 8.) draw S X T for the horizontal line, in which ſet off S T = B E and T X = O Q; alſo, perpendicular to S T, draw S R and T W equal to K L and L M reſpectively: draw R W for your ſubſtyle, perpendicular to which draw *f* W *g* and in it ſet off W Y (= H M) for the altitude of your ſtile, and W *w* for its thickneſs; alſo draw *wr* perpendicular and R *r* parallel to *fg*. In R W and *rw* produced take W *a* and *wb* each equal to W Z, perpendicular to R Y, and through X draw R X 12 meeting *fg* in 12; join *a*, 12 then make the angles 12 *a* 11, 11 *a* 10 each equal to 15 degrees, and the angle *wb* 9 equal to the exceſs of 15 degrees above the angle W *a* 10. Alſo make the angles 9 *b* 8, 8 *b* 7, &c. each equal to 15 degrees, then right-lines drawn from R to 11, 10, 1, 2, and from *r* to 9, 8, 7, 6 will be the hour-lines of 11, 10, 1, 2, 9, &c.

In order to ſhew that the upper edge of the ſtyle, when the dial is placed in its proper poſition, will be parallel to the earth's axis (as it ought to be by definition 2) it has been already proved, in the preceding problem, that when the plane A B E K (*fig.* 1.) is perpendicular to the plane of the horizon, the ſtyle F A is parallel to the earth's axis, in which caſe (the planes K E H, A E F and E B D being all perpendicular to the plane A B E K) the lines E D, E H and E F coincide, and conſequently expreſs the altitude of the point F, of the ſtyle, above the plane A B E K. Now, as the angle E K L expreſſes the given reclination or the inclination of the propoſed plane to the vertical plane, if the lines A H, A M be drawn, H M will expreſs the altitude of the point F above the plane A K M and A H will coincide with A F and ſo be parallel to the earth's axis. But as S R (*fig.* 2.) is by conſtruction equal to K L, if the parallelogram S V be completed, V W will be = K M the triangle R V W equal and ſimilar to the triangle A K M, and the triangle R W Y equal and ſimilar to the triangle A M H; conſequently when the plane of the ſtyle, repreſented by the triangle R W Y, is erected perpendicular to the plane of the dial on the line R W, the upper edge (R Y) thereof will paſs through the pole of the world, and ſo be parallel to the earth's axis.

If the dial be conſtructed for a northern latitude and E L be greater than E H, or, which is the ſame thing, K L greater than K M, the north pole will be elevated and the point W, in the ſubſtyle R W, will fall on the contrary ſide of R.

If it be required to deſcribe a reclining ſouth dial, for a northern latitude, to decline weſterly; or a reclining north dial, for a ſouthern latitude, to decline eaſterly; the method of conſtruction will ſtill be the ſame, only, inſtead of beginning the operation on the left ſide of A B and R S, you muſt begin on the right ſide of them.

In deſcribing a reclining north dial, for a north latitude, to decline eaſterly; or a reclining ſouth dial, for a ſouthern latitude to decline weſterly; the conſtruction differs from the former, inſomuch that the points A, B, E and K change the poſition and fall in the places of E, K, A and B reſpectively, and that the line K L falls on the contrary ſide of K E, with reſpect to the line K H; alſo that the points R, S, T and V fall in the places of T, V, R and S reſpectively, and that the hour-lines of 1, 2 become thoſe of 11, 10, and thoſe of 11, 10, 9, &c. become the hour-lines of 1, 2, 3, &c.

If the plane of a reclining ſouth dial, declining eaſterly, in a northern latitude, be inverted; the dial will then become an inclining north dial, declining weſterly, for the ſame latitude; but the morning hour-lines in the reclining dial will become the afternoon hour-lines in the inclining one. In like manner, a reclining north dial, declining weſterly, in a ſouthern latitude, will become an inclining ſouth dial, declining eaſterly, for the ſame latitude. Alſo a reclining ſouth dial, declining weſterly, in a northern latitude, will become an inclining north dial, declining eaſterly, for the ſame latitude; and a reclining north dial, declining eaſterly, in a ſouthern latitude, will become an inclining ſouth dial, declining weſterly, for the ſame latitude. Moreover, a reclining north dial, declining eaſterly, in a northern latitude, will become an inclining ſouth dial, declining weſterly, for the ſame latitude; and a reclining ſouth dial, declining weſterly, in a ſouthern latitude, will become an inclining north dial, declining eaſterly, for the ſame latitude.

Having now given the conſtruction of the various kinds of dials, whether erect, declining, reclining, or inclining, we ſhall here put down the general demonſtration of the method, all along uſed, in drawing of the hour-lines, which we promiſed in our firſt problem, and thought would be better than taking up room with the particular demonſtration of each problem, as they all depend upon the ſame principle.

Let A E (*fig.* 9.) be the ſubſtyle, A F the ſtyle, A 12 the meridian line, and A G any other hour-line at pleaſure; making (as is every where done) E H perpendicular to A F and $E h = E H$; alſo let h G and G H be drawn.

Becauſe the ſun, in his apparent diurnal revolution, deſcribes an angle of 15° each hour about the axis of the earth, or the ſtyle A F of the dial, which is parallel to it, it is evident that if a plane, coinciding with (or lying upon) the line A F, be ſuppoſed to revolve about the ſame as an axis, at the rate of 15° *per* hour, it will when produced paſs through the ſun, and conſequently its interſection with the plane of the dial will mark out the true poſition of the hour-lines.

Now it is known that the angle included between any two planes is equal to (or meaſured by) the angle made by two lines in thoſe planes perpendicular to their common interſection: alſo, by the general method all along uſed, the angle E h G is equal to the given hour-angle betwixt the time of the planes falling upon the ſubſtyle and the propoſed hour-line A G: but the line H G is perpendicular to the axis A F, becauſe the plane G H E, being perpendicular to the plane of the ſtyle E F A, all the lines in that plane (and conſequently H G) will be perpendicular to A F. Moreover, the triangles E H G, E h G having $E H = E h$, E G common, and the angles H E G and h E G both right, are equal in all reſpects, and conſequently the angle G H E, meaſuring the inclination of the plane betwixt the times of its falling on the ſubſtyle and the hour-line A G, will be equal to the angle G h E = the ſaid hour angle by conſtruction.

The above curious track was written by the late celebrated Mr. T. Simpſon, of Woolwich, and publiſhed ſometime ago in a periodical work called Mathematical Exerciſes; but as that book is in very few hands, and not now to be had, we dare ſay it will here be an acceptable preſent to the public, and we need not be aſhamed to acknowledge that it was not in our power to have ſaid any thing better on the ſubject.

DIALECT, διαλεκτος, an appellation given to the language of a province, in ſo far as it differs from that of the whole kingdom. The term, however, is more particularly uſed in ſpeaking of the ancient Greek, whereof there were four dialects, the Attic, Ionic, Æolic, and Doric, each of which was a perfect language in its kind, that took place in certain countries, and had peculiar beauties.

In Great-Britain, beſides the grand diverſity of Engliſh and Scotch, almoſt every county has a dialect of its own, and differing conſiderably in pronunciation, accent, and tone, although one and the ſame language.

DIALECTICS, *Dialectica*, in the literary hiſtory of the ancients, that branch of logics which taught the rules and modes of reaſoning. See LOGIC.

DIALING, the art of conſtructing all manner of dials.

The antiquity of dials is beyond all doubt very great: ſome attribute their invention to Anaximenes Mileſius, and others to Thales: Vitruvius mentions one made by the ancient Chaldean Beroſus, on a reclining plane, almoſt parallel to the equinoctial. Ariſtarchus Samius invented the hemiſpherical dial: and there were at the ſame time ſome ſpherical ones with a needle for the gnomon. The diſcus of Ariſtarchus was an horizontal dial, with its limb raiſed up all round, to prevent the ſhadow from ſtretching out too far.

It was very late before the Romans knew any thing of dialing: Papyrius Curſon ſet up the firſt ſun-dial at Rome, about the year of the city 460; before which time, ſays Pliny, they had no account of time, but the ſun's riſing and ſetting. This dial muſt have been but a very indifferent one; for ſo ignorant were they of the principles of dialing in the conſulſhip of M. Valerius Meſſalla, which was ſome time after this that he ſet up a dial at Rome, which he brought from a port of Sicily, whoſe latitude was ſeveral degrees different from that of Rome.

Dials ſeem to have been in uſe much ſooner amongſt the eaſtern nations, eſpecially the Jews; for we read of the dial of Ahaz, who, according to the beſt chronologiſts, began to reign within twelve years after the building of Rome.

The firſt profeſſed writer on dialing that we know of is Clavius, who demonſtrates both the theoretical and practical parts of it after the rigid method of the ancients. After him Dechales, Ozanam, Picard, Walkerius, and De la Hire have handled this ſubject, and made great improvements in it. Their works, together with ſome conſiderable additions, have been republiſhed by Sturmius, Coetſia, and Bion, and have been tranſlated into our own language by ſeveral hands.

But dialing ſeems to have received its greateſt improvements from our own countrymen, Gunter, Wright, Foſter, Collins, Molyneux, and others.

Dialing-Globe, an inſtrument of braſs or wood, with a plane fitted to the horizon, and an index, ſo contrived as to give a clear illuſtration of the principles on which dials are made.

Dialing-Lines, or **Scales**, are graduated lines placed on rulers, or the edges of quadrants and other inſtruments, to expedite the conſtruction of dials. Theſe are, 1. A ſcale of ſix hours, which is only a double tangent, or two lines of tangents, each of 45°, ſet together in the middle, and equal to the whole line of ſines, with the declination ſet againſt the meridian altitudes in the altitude of the place. 2. A line of latitudes, which is fitted to the hour-ſcale, and is made by this canon. As the radius : to the chord of 90° : : ſo are the tangents of each reſpective degree of the line of latitudes : to the tangents of other arches ; and then the natural ſines of theſe arches are the numbers which, taken from a diagonal ſcale of equal parts, ſhall graduate the diviſions of the line of latitudes to any radius. The lines of hours and latitudes are, in general, for pricking down all dials with centers.

The other ſcales are particular, and give the ſeveral requiſites for all upright declining dials by inſpection. They are, 1. A line of chords. 2. A line for the ſub-ſtyle's diſtance from the meridian. 3. A line for the ſtyle's height. 4. A line of the angle of 12 and 6. 5. A line of inclination of meridians.

Dialing-Sphere, an inſtrument made of braſs, with ſeveral ſemi-circles ſliding over each other upon a moveable horizon ; ſerving to demonſtrate the nature of ſpherical triangles, as well as to give the true idea of drawing dials on all ſorts of planes.

Dialing, among miners, the ſame with plumming. See the article Plumming.

DIALOGISM, διαλογισμος, in rhetoric, is uſed for the ſoliloquy of perſons deliberating with themſelves, as the following of Juno, in the firſt Æneid of Virgil :

> —— *mene incepto deſiſtere victam?*
> *Nec poſſe Italia Teucrorum avertere regem?*
> *Quippe vetor fatis? &c.*

In this ſenſe it is diſtinguiſhed from dialogue.

DIALOGUE, in matters of literature, a converſation between two or more perſons, either by writing or by word of mouth.

The word is formed from the Greek, δια, together, and λογος, a diſcourſe.

DIALYSIS, in grammar, a mark or character, conſiſting of two points, ¨ , placed over two vowels of a word, in order to ſeparate them, becauſe otherwiſe they would make a diphthong, as Moſaïc, &c. See the article Diæresis.

DIAMETER *of a Circle*, in geometry, is a right-line paſſing through the center, and terminating both ways in the circumference. See the article Circle.

Diameter *of a Curve*, in the higher geometry, is a line, either right, or curved, which biſects all parallels drawn from one point of the curve to another.

Diameter *of a Sphere*, is the diameter of the ſemi-circle, by whoſe rotation the ſphere is generated ; in which ſenſe it is the ſame with axis. See the article Axis.

Diameters *of the heavenly Bodies*, in aſtronomy, are different, according to different authors ; owing either to the different degrees of perfection in the inſtrument made uſe of, or elſe to the different degrees of accuracy in the obſervers, or perhaps to both : we ſhall give the quantities of ſuch of them as have come to our knowledge.

Object.	Obſerver.	Greateſt diameter	Leaſt diameter
		′ ″	′ ″
Sun	Ptolemy	33.20.0	31.20.0
	Tycho	32. 0.0	30. 0.0
	Kepler	31. 4 0	30. 0.0
	Caſſini	32.10.0	31. 8.0
	De la Hire	32.43.0	31.38.0
	Hally	32.43.0	31.38.0
	De la Caille	32.39.2	31.34.4
	Mayer	32.38.6	31.33.8
Moon	Ptolemy	35.20.0	31.20.0
	Tycho } conjunction	28.48.0	25.36.0
	Tycho } oppoſition	36. 0.0	32. 0.0
	Kepler	32.44.0	30. 0.0
	De la Hire	33.30 0	26.30.0
	Hally	33.36 0	29.25.0
	Mayer	33.36.5	28.54.2
	Bradley	33.40.0	29. 0.5
Saturn	Tycho	2.12.0	1.34.0
	Hevelius	0.19.0	0.14.0
	Huygens	0. 0.0	0. 0.0
Jupiter	Tycho	3.59.0	2.14.0
	Hevelius	0.24.0	0.14.0
	Huygens	0. 0.0	1. 4.0
Mars	Tycho	6.46.0	0.57.0
	Hevelius	0.20.0	0. 2.0
	Huygens	0. 0.0	0.30.0
Venus	Tycho	4.40.0	1.52.0
	Hevelius	1. 5.0	0. 9.0
	Huygens	0. 0.0	1.25.0
Mercury	Tycho	3.57.0	1.29.0
	Hevelius	0.11.0	0. 4.0

It muſt be noted, that Tycho made all his obſervations with the naked eye, which makes his differ ſo much from the others.

Diameter *of a Column*, in architecture, is its thickneſs juſt above the baſe. See Column.

From this the module is taken, which meaſures all the other parts of a column. See the article Module.

DIAMOND, *Adamas*, in natural hiſtory, a ſtone which, though naturally colourleſs like the pureſt water, is eminently diſtinguiſhed from all others of the colourleſs kind by the luſtre of its reflections.

It is found ſometimes in an angular, and ſometimes in a pebble-like form. In its angular ſtate however it does not, like the reſt, reſemble the common ſpring cryſtal, but the more perfect bodies of that claſs, the double-pointed ones.

The true figure of the diamond in its angular, that is, its more perfect form, is an inequilateral octahedron, compoſed of two quadrilateral pyramids affixed baſe to baſe, and conſequently their points turned the oppoſite way; theſe the jewellers call ſix-pointed ſtones: but beſides this, there are two other leſs perfect angular figures, a columnar one of ſix ſides, and an oblong quadrilateral column with two truncated ends; beſides, there is an almoſt infinite variety of others, cornered and pointed, but which properly belong to it in its pebble form. In this ſtate it is ſometimes roundiſh, ſometimes oblong, and ſometimes flat, and in ſome ſpecimens perfectly ſmooth, in others full of inequalities on the ſurface.

In whichſoever of theſe forms the diamond is found, it is the ſame ſtone, and when poliſhed has the ſame qualities in proportion to its perfection and purity.

The diamond, like all other tranſparent foſſils, is liable to be tinged by metalline particles, and is ſometimes found with a caſt of red, ſometimes blue, ſometimes green, and more frequently yellow. The ſmall diamonds are vaſtly the more plentiful, the others are found more and more rarely as they increaſe in ſize. The largeſt ever certainly known is now in the poſſeſſion of the Great Mogul; its weight is 279 carats, and its value is computed at between ſeven and eight hundred thouſand pounds.

As diamonds have originally, without all queſtion, being concreted out of a fluid, it is not at all ſurpriſing, that among the various accidents ſuch a concretion muſt have been attended within the bowels of the earth; ſome parts of the matter ſhould have ſhot into quadrangular pyramids, while other parts of it form themſelves into hexangular, pyramidal, or pebble-like concretions.

The diamond in its native ſtate is ſometimes bright as if poliſhed by art, but more frequently its ſurface is obſerved with foulneſſes of various kinds; and ſometimes it is, as the diamond-cutters call it, veiny, that is, it has certain points inconceivably hard on its ſurface.

The diamond bears the force of the ſtrongeſt fire unhurt, if ever ſo long continued in it, provided it be not removed too ſuddenly into the cool air, when it will ſometimes crack. Expoſed to the ſolar rays collected in the focus of a large lens, it after ſome time ſplits into ſeveral very thin flakes, like thoſe of talc, and theſe ſoon after run into a kind of glaſs, which has nothing of the hardneſs or luſtre of the diamond.

The places whence we have the diamonds are the Eaſt-Indies, in the iſland of Borneo, and in the kingdom of Viſapour, Golconda, Bengal; and the Braſils in the Weſt-Indies.

The diamond, as has been obſerved, is the hardeſt of all precious ſtones; it can only be cut and ground by itſelf, and its own ſubſtance.

To bring it to that perfection which augments its price ſo conſiderably, they begin by rubbing two ſtones againſt each other, while rough, after having well cemented them to the ends of two ſticks, or blocks, called cutting ſticks, thick enough to be held in the hand. It is this powder thus rubbed off the ſtone, and received in a little box for that purpoſe, called the cutting-box, which ſerves to grind and poliſh the ſtones.

Diamonds are cut and poliſhed by means of a mill, which turns a wheel of caſt iron, ſprinkled over with diamond duſt, mixed with oil of olives.

The ſame duſt, well ground and diluted with water and vinegar, is uſed in the ſawing of diamonds, which is performed with an iron or braſs wire as fine as a hair.

Sometimes, inſtead of ſawing the diamonds, they cleave them, eſpecially if there be any ſmall ſhivers in them; but the Europeans rarely run the riſque of cleaving, for fear of breaking them.

A rough diamond ought to be choſen uniform, of a good ſhape, tranſparent, not quite white, and free from flaws and ſhivers.

Shivers are cauſed in diamonds by this, that the miners, to get them more eaſily out of the vein, which winds between two rocks, break the rocks with huge iron levers, which ſhakes and fills the ſtone with ſhivers.

The ancients had two miſtaken notions as to the diamond; the firſt is, that it becomes ſoft, by ſteeping it in hot goat's blood; and the ſecond, that it is malleable, and bears the hammer; but however, experience has ſhewn the contrary, there being nothing capable of mollifying the hardneſs of the ſtone; and its hardneſs is ſuch, that it will endure being ſtruck at pleaſure with the hammer.

The fineſt diamonds now in the world are that of the Great Mogul, weighing 279 carats, as has been already obſerved; that of the great duke of Tuſcany, weighing 139 carats; and that known in France by the name of grand ſancy, which is one of the crown jewels, weighing 106 carrats; whence comes its name ſancy, which is a corruption of cent. ſix; that is, 106.

Valuation of Diamonds, among jewellers, is thus calculated: they ſuppoſe the value of a rough diamond to be 2 *l.* per carat; then to find the value of thoſe of greater weight, they multiply the ſquare of their weight by 2, and this laſt product is the value of the diamonds in their rough ſtate: thus, the value of a rough diamond, weighing 4 carats, is equal $4 \times 4 \times 2 = 16 \times 2 = 32$ *l.* and ſo in other caſes.

Again, to find the value of wrought diamonds, they ſuppoſe half their weight loſt in the manufacturing them, and therefore multiply the ſquare of double their weight by 2: thus the value of a wrought diamond, weighing 3 carats, is equal $6 \times 6 \times 2 = 36 \times 2 = 72$ *l.*

Corniſh Diamond, in natural hiſtory, a name given to a kind of cryſtals, from their being found in Cornwall.

Rough Diamond, is the ſtone as nature produces it in the mines.

Roſe Diamond, is that quite flat underneath, with its upper-part cut in divers little faces, uſually triangles, the uppermoſt of which terminate in a point.

Table Diamond, is that which has a large ſquare face at top, encompaſſed with four leſſer.

Brilliant Diamond, is that cut in faces, both at top and bottom; and whoſe table, or principal face at top, is flat.

Diamond, in the glaſs trade, an inſtrument uſed for ſquaring the large plates or pieces; and among glaziers, for cutting their glaſs.

Theſe ſort of diamonds are differently fitted up; thoſe uſed for cutting looking-glaſs, &c. are called plough-diamonds, fitted into a kind of plane; and thoſe made uſe of by glaziers, are ſet in an iron ferril, about two inches long, and a quarter of an inch or ſomewhat more, in diameter; and in which is a handle of box, ebony, &c. fitted to the ferril, for holding it by.

Diamond, in Heraldry, a term uſed for expreſſing the black colour in the atchievements of peerage.

Guillim does not approve of blazoning the coats of peers by precious ſtones inſtead of metals and colours; but the Engliſh practice allows it. Morgan ſays the diamond is the emblem of fortitude.

DIAMORUM, in pharmacy, a preparation of mulberries and honey, uſed againſt diſeaſes of the throat, and for ſtopping dyſenteries, &c.

DIANÆ Arbor, or Arbor Lunæ, in chemiſtry, the beautiful cryſtallizations of ſilver, diſſolved in aquafortis, to which ſome quickſilver is added; and ſo called from their reſembling the trunk, branches, leaves, &c. of a tree.

DIANDRIA, the name of the ſecond claſs in the Linæan ſyſtem of botany, and comprehends all ſuch plants as bear hermaphrodite flowers, furniſhed with two ſtamina in each; of this claſs are the jaſmine, phillyrea, lilac, olive, ſage, roſemary, with ſeveral other genera.

DIANTHERA, in botany, a genus of plants whoſe corolla conſiſts of a ſingle ringent petal with two filaments toped with twin antheræ; the fruit is a bivalvular capſule, with two cells, each containing a ſolitary lentiform ſeed.

DIANTHUS, in botany, a name given by Linnæus to the caryophyllus of other botaniſts, and comprehends the pink, carnation, clove july-flower, and ſweet-william. See the articles Pink, Carnation, &c.

DIAPASMA, in pharmacy, a name for all powders ſprinkled on the body, whether as perfumes or otherwiſe. See the article Catapasma.

DIAPASON, in muſic, a muſical interval, by which moſt authors, who have wrote upon the theory of muſic, uſe to expreſs the octave of the Greeks. See Octave.

Diapason, among the muſical inſtrument-makers, a kind of rule or ſcale, whereby they adjuſt the pipes of their organs, and cut the holes in their flutes, hautboys, &c. in due proportion, for performing the tones, ſemi-tones, and concords juſt.

A ſquare being divided into eight parallelograms, the points wherein a diagonal line interſects all theſe parallelograms, expreſs all the uſual intervals in muſic: and on this principle it is that the diapaſon is founded. There is a particular kind of diapaſon for trumpets, ſerving as a ſtandard of the different magnitudes they muſt have to perform the four parts of muſic. See the article Trumpet.

There is another for ſackbuts, ſhewing how far they are to be lengthened and ſhortened, to raiſe or fall from one tone to another.

The bell-founders have likewiſe a diapaſon, ſerving to regulate the ſize, thickneſs, weight, &c. of their bells.

Diapason Diaex, in muſic, a kind of compound concord, whereof there are two ſorts; the greater, which is in the proportion of 10 : 3; and the leſſer, in that of 16 : 5.

Diapason Diapente, in muſic, a compound conſonance in a triple ratio, as 3 : 9. This interval, ſays Martianus Capella, conſiſts of nine tones and a ſemi-tone, nineteen ſemi-tones, and thirty-eight dieſes. It is a ſymphony made when the voice proceeds from the firſt to the twelfth ſound.

Diapason Diatessaron, in muſic, a compound concord, founded on the proportion of 8 : 3. To this interval Martianus Capella allows eight tones and a ſemi-tone, ſeventeen ſemi-tones, and thirty-four dieſes.

This is when the voice proceeds from its firſt to its eleventh ſound. The moderns would rather call it the eleventh.

Diapason Ditone, in muſic, a compound concord, whoſe terms are as 10:4, or 5 : 2.

Diapason Semiditone, in muſic, a compound concord, whoſe terms are in the proportion of 12 : 5.

DIAPEDESIS, in medicine, a tranſudation of the fluids through the ſides of the veſſels that contain them, occaſioned by the blood's becoming too much attenuated, or the pores becoming too patent.

DIAPENSIA, in botany, a genus of plants, whoſe flower conſiſts of a monopetalous hypocrateriform corolla, with five ſtamina. The fruit is a trilocular roundiſh capſule, incloſing a great number of roundiſh ſeeds.

DIAPENTE, in the ancient muſic, an interval marking the ſecond of the concords; and with the diateſſaron, an octave.

This is what, in the modern muſic, is called a fifth.

Diapente Col Ditano, in muſic, is, by Zarlin, and many others, uſed for what we call the ſeventh major. See the article Seventh.

Diapente Col Semiditano, in muſic, is the ſeventh minor. See the articles Minor and Major.

Diapente, in pharmacy, is uſed for a medicine compounded of five ſeveral drugs or ingredients.

DIAPERED, or Diapre, in heraldry, the dividing of a field in planes, like fret-work, and filling the ſame with variety of figures. This chiefly obtains on bordures, which are diapered or fretted over, and the frets charged with things proper for bordures. Baron renders it *variatus*, which is not ſufficient to expreſs the ſeveral things of which it is variated.

DIAPHANOUS, an appellation given to all tranſparent bodies, or ſuch as tranſmit the rays of light; a quality which, according to the Carteſians, is owing to the rectitude or ſtraightneſs of their pores; but, according to Sir Iſaac Newton, to the homogeneity of the ſubſtance of theſe bodies, and of the medium which occupies their pores.

DIAPHOENICUM, in pharmacy, a ſort of medicine or electuary, chiefly made of dates. It purges ſeroſities, and excites the menſes. It is alſo uſed in dropſies, lethargies, apoplexies, and palſies.

DIAPHORESIS, διαφόρησις, in medicine, an elimination of the humours in any part of the body through the pores of the ſkin. See the article Perspiration.

DIAPHORETICS, among phyſicians, all medicines which promote perſpiration. See the article Alexipharmic.

DIAPHRAGM, in anatomy, the part which ſeparates the thorax from the abdomen; vulgarly called the midriff.

The word is derived from the Greek, διαφρασσω, to incloſe or wall in.

It is alſo called ſeptum tranſverſum, or croſs-wall, from its ſituation, becauſe it divides the trunk of the body into two cavities, the thorax and abdomen. It is compoſed of two muſcles; the firſt and ſuperior of theſe ariſes from the ſternum, and the ends of the laſt ribs, in each ſide. Its fibres, from this ſemi-circular origination, tend towards their center, and terminate in a tendon, or aponeuroſis, which hath always been taken for the nervous part of the midriff. The ſecond and inferior muſcle comes from the vertebræ of the loins by two productions, of which that on the right-ſide comes from the firſt, ſecond, and third vertebræ of the loins; that on the left-ſide is ſomewhat ſhorter; and both theſe productions join and make the lower part of the midriff, which joins its tendon with the tendon of the other, ſo as that they make but one membrane, or rather partition. It is covered with a membrane on its upper-ſide, and by the peritonæum on the lower-ſide. It is pierced in the middle for the paſſage of the vena cava, in its lower-part for the œſophagus, and the nerves which go to the upper orifice of the ſtomach; and betwixt the productions of the inferior muſcle, paſſes the aorta, the thoracic duct, and the vena azygos. It receives arteries and veins called phrenicæ, from the cava and aorta; and ſometimes on its lower-part two branches from the vena adipoſa, and two arteries from the lumbares. It has two nerves which come from the third vertebræ of the neck, which paſs through the cavity of the thorax, and are diſperſed in the muſcles of the midriff. In its natural ſituation, it is convex on the upper-ſide towards the breaſt, and concave on its lower ſide towards the belly: therefore, when its fibres ſwell and contract, it muſt become plane on each ſide, and conſequently the cavity of the breaſt is enlarged to give liberty to the lungs to receive the air in inſpiration; and the ſtomach and inteſtines are preſſed for the diſtribution of the chyle: but it diminiſhes the cavity of the breaſt when it reſumes its natural ſituation, and preſſes the lungs for the expulſion of the air in exſpiration.

DIAPHORESIS, in rhetoric, a figure of oratory, expreſſing the uncertainty of the ſpeaker how he ſhall proceed in his diſcourſe.

DIARBEC, or Diarbeck, a province in Aſia, anſwering to the ancient Meſopotamia: it is ſituated on the river Tigris, near its ſource, in the 42^d deg. eaſt long. and in the 37^th deg. 30 min. north lat. It is alſo the capital of the ſame province.

DIARRHODON, in pharmacy, a name given to divers compoſitions in which roſes are the principal ingredient.

DIARRHOEA, in medicine, a looſeneſs, or a frequent and plentiful diſcharge of thin, watery, mucous, ſlimy, frothy, bilious, or blackiſh matter from the inteſtines, ſometimes with, and ſometimes without a mixture of the inteſtines.

The word is formed from the Greek δια, through, and ρεω, to flow.

DIARTHROSIS, in anatomy, a kind of articulation, or juncture of the bones, in which there is a manifeſt motion. See the article ARTICULATION.

The diarthroſis comprehends, 1. The enarthroſis, in which the head of one of the bones is received into a deep cavity in the other, as in the articulation the femur. 2. The arthrodia, in which the head of one of the bones is received into a ſlighter cavity in the other, as in the juncture of the os humeri with the ſcapula. 3. The ginglymus, in which the bones mutually receive, and are received by one another, as in the caſe in the articulation of the humerus and cubitus.

To theſe, Fallopius adds the trochoides, in which the motion is like that of a wheel about its axis, as is the caſe of the articulation of the firſt vertebræ of the neck with the ſecond: and to all theſe ſome of the modern anatomiſts have added alſo the amphiorthroſis, a term which comprehends all thoſe junctures of the bones which have a manifeſt motion, and which differ from the ſeveral articulations now deſcribed, either in regard of their figure, or the motion they allow of. See the articles ENARTHROSIS, ARTHRODIA, GINGLYMUS, &c.

DIARY, among traders, denotes a day-book containing the proceedings of one day. See the article BOOK-KEEPING.

DIARY FEVER, the ſame with an ephemera. See the article EPHEMERA.

DIASCHISM, διασχισμα, among muſicians, denotes the difference between the comma and enharmonic dieſis, commonly called the leſſer comma.

DIASCORDIUM, in pharmacy, a celebrated compoſition, ſo called from ſcordium, one of its ingredients.

DIASEBESTEN, in pharmacy, a ſoft purgative electuary, of which ſebeſtens are the principal ingredients.

DIASENNA, in pharmacy, the name of a medicine in which ſenna is the principal ingredient.

DIASIA, in Grecian antiquity, a feſtival kept at Athens in honour of Jupiter the Propitious.

DIASTASIS, a term uſed by ancient phyſicians for a diſtention of the muſcles, or ſeparation of the bones.

DIASTEM, διαϛημα, among ancient muſicians, the ſame with what the moderns call interval. See INTERVAL.

DIASTOLE, διαϛολη, among phyſicians, ſignifies the dilatation of the heart, auricles, and arteries; and ſtands oppoſed to the ſyſtole, or contraction of the ſame parts. See SYSTOLE and HEART.

DIASTOLE, in grammar, a figure of proſody, whereby a ſyllable naturally ſhort is made long: ſuch is the firſt ſyllable of Priamedes, in the following verſe of Virgil:

Atque hic Priamides: nihil ô tibi, amice, relictum.

This figure is uſed either out of mere poetic licence, without any neceſſity for doing, or through neceſſity for the ſake of the verſe; as when three or more ſhort ſyllables follow each other in hexameter verſe.

DIASTYLE, in the ancient architecture, an edifice, where the columns ſtand at ſuch a diſtance one from another, that eight modules, or four diameters, are allowed for the intercolumniation.

DIASYRMUS, διασυρμος, in rhetoric, a kind of hyperbole, being an exaggeration of ſome low, ridiculous thing.

DIATESSARON, διατεσσαρον, among ancient muſicians, a concord, or harmonious interval, compoſed of a greater tone, a leſs tone, and one greater ſemi-tone: its proportion in numbers is 4 : 3. See the article CONCORD.

DIATESSARON, in pharmacy, the name of a compoſition ſo called from the four ingredients it comprehends.

DIATONIC, an epithet given to muſic, as it proceeds by tones and ſemi-tones, both aſcending and deſcending. See the articles MUSIC and GENUS.

DIATONICO-DIATONICO, according to Zarlin, is the pure and natural diatonic genus, or when the progreſs of the notes is B quarré or B natural, in which not one of the ſounds is the leaſt altered. Such is the plain chant of the church.

DIATRAGACANTH, in pharmacy, a name applied to certain powders, of which gum tragacanth is the principal ingredient.

DIBBER, or DIBBLE, among gardeners, the name of a tool uſed in ſetting plants.

DICHOTOMY, a term uſed by aſtronomers for that phaſis, or appearance of the moon, wherein ſhe is biſected, or ſhews juſt half her diſc. In this ſituation the moon is ſaid to be in a quadrate aſpect, or be in her quadrature.

DICHOTOMY, in botany, a term uſed to expreſs that diviſion of the branches which we ſee in the miſleto, and in the greater part of the ſea fucus's, in which each branch is divided into two.

DICKER, *Dicra*, in old writers, denotes the quantity of ten hides of ſkins, of which twenty made a laſt: alſo ten pair of gloves, ten bars of iron, and the like, are ſometimes expreſſed by the term dicker.

DICTAMNUS, dittany, or traxinella, in botany, a plant whoſe root is perennial; from whence ariſe ſeveral ſtalks, about two or three feet high; theſe are furniſhed with winged leaves, much reſembling thoſe of the aſh-tree. The flowers are produced in long pyramidical ſpikes, and are of a white or purple colour; the corolla of theſe conſiſts of five ovato-lanceolated unequal petals, two of which turn upwards, one downward, and the other two are oblique on the ſides. The fruit is a capſule with five cells, containing a number of hard ſhining black ſeeds.

The whole plant when gently rubbed, emits an odour like lemon-peel, but when bruiſed, it has a ſtrong ſmell, of an unpleaſant, reſinous, or bituminous kind.

The roots of this plant are uſed in medicine, and are eſteemed cordial and cephalic, reſiſting putrefaction and poiſon; an aperient in uterine obſtructions, and are uſeful in malignant and peſtilential diſtempers.

DICTATE, *Dictamen*, among ſchoolmen, a motion, or ſuggeſtion of a man's conſcience, contrary to which if any action is performed, it is properly termed a bad one, even if the conſequences ſhould prove otherwiſe. See the article Conscience.

Dictate, *Dictata*, is alſo uſed in the ſchools for the lecture of a maſter, which the ſcholars take down in writing; whence this act of the maſter is termed dictating.

DICTATOR, in the policy of the ancient Romans, a magiſtrate inveſted with ſovereign and even arbitrary power.

DICTION, the phraſe, elocution, or ſtyle of a writer, or ſpeaker.

DICTIONARY, a collection of all the words of a language, art, ſcience, &c. with their explanations, ranged in alphabetical order.

The word is formed from the Latin, *dictionarium*, which is derived from *dictio*, a word.

DICTUM, in our old writers, implies an arbitrament or award; and hence the term dictores is uſed for arbitrators.

Dictum de Kenelworth, was an award between king Henry III. and his barons and others who had been in arms againſt him, wherein was contained a compoſition of thoſe that had forfeited their eſtates in the rebellion. It was ſo called on account of its being made at Kenelworth-caſtle in Warwickſhire.

DIDACTIC, or Didactical, in the ſchools, ſignifies the manner of ſpeaking, or writing, adapted to teach or explain the nature of things.

DIDYNAMIA, from δις, twice, and δυναμις, power. The name of the fourteenth claſs in the Linnæan ſyſtem of botany, and comprehends ſuch plants as bear hermaphrodite flowers, furniſhed with four ſubulated ſtamina, inſerted in the tube of the corolla, two whereof are ſhorter than the others and placed together: the corolla in general is monopetalous and erect, of the ringent kind, the upper lip ſtrait and the lower ſpreading and trifid.

It has its name from the two longer ſtamina, being ſuppoſed more efficacious in fecundating the ſeeds than the reſt; and as the genera belonging to it are very numerous, they have been divided into two ſeries or orders, under the names of gymnoſperma and angioſperma, the latter having, and the former wanting, a pericarpium or ſeed-veſſel.

To this claſs belong baum, germandir, lavender, thyme, mint, betony, foxglove, and divers other genera.

DIE, in architecture, the ſame with dye. See the article Dye.

DIESIS, in muſic, is the diviſion of a tone leſs than a ſemi-tone; or, an intetval conſiſting of a leſs or imperfect ſemi-tome.

DIET, *Diæta*, in phyſic, a way and method of living, comprehending not only what is generally underſtood by this word, but alſo whatever elſe concerns the management of human life.

Diet-Drinks, a form in phyſic, including all the medicated wines, ales, and wheys, uſed in chronic caſes. They require a courſe or continuation to anſwer any intention of moment. In all acute caſes they are of no uſe; but where the diſorder of a conſtitution is gradually to be gained upon, much help may be had from this quarter.

Diet, or Dyet, in matters of policy, is uſed for the general aſſembly of the ſtates or circles of the empire of Germany, and of Poland, to deliberate and concert meaſures proper to be taken for the good of the public.

DIETA, a term uſed in old writers for a day's journey.

DIETETIC, denotes ſomething belonging to diet, but particularly that part of phyſic which treats of this ſubject. See the article Diet.

DIEU Et Mon Droit, that is, God and my right, the motto of the royal arms of England, firſt aſſumed by king Richard I. to intimate that he did not hold his empire in vaſſalage of any mortal.

DIFFERENCE, in logic, ſignifies an eſſential attribute belonging to any ſpecies that is not found in the genus, and is the univerſal idea of that ſpecies: thus, body and ſpirit are two ſpecies of ſubſtance, which contain in their ideas ſomething more than is in that of ſubſtance. In a body, we find impenetrability and extenſion; in a ſpirit, a power of thinking and reaſoning; ſo that the difference of body is impenetrable extenſion, and the difference of a ſpirit is cogitation.

Difference, in mathematics, is the remainder, when one number or quantity is ſubtracted from another.

DIFFERENCE *of Longitude* of two places on the earth, is an arch of the equator, comprehended between the meridians of theſe two places.

DIFFERENCE *of Aſcenſion.* See the article ASCENSIONAL *Difference.*

DIFFERENCES, in heraldry, certain admittaments to coat-armour, whereby ſomething is added or altered to diſtinguiſh younger families from the elder.

DIFFERENTIAL, in the higher geometry, is an infinitely ſmall quantity; or in other words, leſs than any aſſignable one.

DIFFERENTIAL CALCULUS, is the method of differencing quantities, that is, of finding a differential.

The differential calculus is the ſame with the doctrine of fluxions; the former being the name given to it by Mr. Leibnitz, who claims the invention thereof againſt Sir Iſaac Newton, who called it the method of fluxions. See FLUXIONS.

The only difference between Sir Iſaac's method, and that of Mr. Leibnitz is this; Sir Iſaac denotes the fluxion, a quantity, x by $\dot{x}$, and Mr. Leibnitz by dx.

DIFFORM, *Difformis*, an appellation given to things whoſe appearance is irregular, in contradiſtinction to uniform.

DIFFUSE, an epithet applied to ſuch writings as are wrote in a prolix manner. Among hiſtorians, Salluſt is reckoned ſententious, and Livy diffuſe. Thus alſo among the orators, Demoſthenes is cloſe and conciſe; Cicero, on the other hand, is diffuſe.

DIFFUSION, the diſpoſition of the ſubtile effluvia of bodies into a kind of atmoſphere all round them. Thus the light diffuſed by the rays of the ſun, iſſues all round from that amazing body of fire; and thus are the magnetic particles diffuſed every where round about our earth, and parts adjacent to it.

DIGAMMA, a name given to the letter F. See the article F.

DIGASTRICUS, in anatomy, a muſcle of the lower jaw, called alſo biventer. See the article BIVENTER.

DIGEST, *Digeſtum*, in matters of literature, a collection of the deciſions of the Roman lawyers properly digeſted, or arranged under diſtinct heads, by order of the emperor Juſtinian. It conſtitutes the firſt part or volume of the civil law.

DIGESTER, or DIGESTOR. See the article DIGESTOR.

DIGESTION, in phyſic, is the diſſolution or ſeparation of the aliments into ſuch minute parts as are fit to enter the lacteal veſſels, and circulate with the maſs of blood.

The word is derived from the Latin *digero*, to concoct. For the manner how digeſtion is performed, ſee BLOOD and CHYLE.

DIGESTION, in chemiſtry, is the ſubjecting bodies, included in proper veſſels, to the action of a gentle and continued heat.

DIGESTION, in ſurgery, is the diſpoſing of an ulcer or wound to ſuppurate, or to diſcharge good pus, by the application of proper medicines.

DIGESTIVE, in medicine, ſuch remedies as ſtrengthen and increaſe the tone of the ſtomach, and aſſiſt in the digeſtion of foods. See the article DIGESTION.

To this claſs belong all ſtomachics and ſtrengtheners, or corroborants.

DIGESTIVE, in ſurgery, ſuch medicines as are applied to wounds, &c. in order to promote a good maturation and laudable ſuppuration of matter. Lenient, anodyne, and balſamic digeſtives, are to be applied to a gangrene. Digeſtives of turpentine, and the yolks of eggs, are uſeful in abſceſſes, wounds, and ulcers.

DIGESTOR, in chemiſtry, a ſtrong veſſel made of copper, or iron, fitted with a cloſe cover and ſcrews, ſo as to remain perfectly tight, in a conſiderable degree of heat; whilſt water, common air, and the ſubject of the operation are contained within.

DIGGING, among miners, is appropriated to the operation of freeing any kind of ore from the bed or ſtratum in which it lies, where every ſtroke of their tools turns to account; in contradiſtinction to the openings made in ſearch of ſuch ore, which are called hatches or eſſay-hatches, and the operation itſelf, tracing of mines, or hatching.

DIGIT, in aſtronomy, a meaſure by which it is uſual to expreſs the quantity obſerved in eclipſes of the ſun and moon. Its quantity is the twelfth part of the diameter of the luminary ſpoke of at that time, be it what it will.

DIGITALIS, foxglove, in botany, a genus of plants, whoſe flower is monopetalous, labiated, and bell-ſhaped, with four ditynamious ſtamina.

The fruit is a bilocular, oval capſule, containing a number of ſmall ſeeds.

A ſpecies of foxglove grows naturally in many parts of England, and is reputed a cathartic, emetic, and vulnerary.

DIGITATED LEAF, among botaniſts, is one which is compoſed of ſeveral foliola, joined to one foot-ſtalk at their baſe, ſpreading like the fingers of the hand; and one termed binate, ternate, or quinate, according to the number of foliola of which the digitated leaf conſiſts.

DIGITUS, FINGER, in anatomy. See the article FINGER.

DIGLYPH, in architecture, a kind of imperfect triglyph, conſole, or the like, with two channels or engravings, either circular or angular. See the article TRIGLYPH.

DIGNITARY, in the canon law, a perſon who holds a dignity, that is, a benefice which gives him ſome pre-eminence over mere prieſts and canons.

Such is a biſhop, dean, arch-deacon, prebendary, &c. See the articles BISHOP, DEAN, &c.

DIGNITY, as applied to the titles of noblemen, ſignifies honour and authority.

DIGYNIA, the name of an order or ſubdiviſion in the Linnæan ſyſtem of botany, and is applied to thoſe flowers which have two ſtyles.

DIHELIOS, in aſtronomy, a name given by Kepler to that ordinate of the ellipſis which paſſes through the focus where the ſun is ſuppoſed to be placed.

DIJAMBUS, in ancient poetry, a double iambus. See the article IAMBUS.

DIKE, a ditch, or drain, made for the paſſage of waters. See DITCH, &c.

DIKE alſo ſignifies a work of ſtone, timber, earth, faſcines, &c. raiſed to oppoſe the entrance of the waters of the ſea, a river, lake, &c.

The moſt ſtupendous works of this kind are the dikes of Holland.

DIKE-REEVE, an officer who takes care of the dikes and drains in Lincolnſhire.

DILAPIDATION, in law, a waſteful deſtroying or letting buildings, eſpecially parſonage-houſes, &c. run to decay, for want of neceſſary reparation. If the clergy neglect to repair the houſes belonging to their benefices, the biſhop may ſequeſter the profits thereof for that purpoſe: and in theſe caſes, a proſecution may be brought either in the ſpiritual court, or at common law, againſt the incumbent himſelf, or againſt his executor or adminiſtrator.

DILATATION, in anatomy, is when any paſſage or receptacle in the body, &c. is too much ſtretched or diſtended: and in general, it ſignifies a thing's taking up more ſpace than it did before.

The word is derived from the Latin *dilato*, to expand, or ſtretch out.

DILATATION, in ſurgery and anatomy, denotes the widening the orifice of a wound; or the diſtenſion of any veſſel, or the like.

DILEMMA, in logic, an argument conſiſting of two or more propoſitions, which divides the whole into all its parts, or members, by a disjunctive propoſition, and then infers ſomething concerning each part, which is finally referred to concerning the whole.

Inſtances of this are frequent, as "In this life we
" muſt either obey our vicious inclinations, or reſiſt
" them: to obey them will bring ſin and ſorrow;
" to reſiſt them is laborious and painful: therefore
" we cannot be perfectly free from ſorrow and pain
" in this life."

DILIGENZA, in muſic, is uſed for a ſoft or ſweet manner of ſinging or playing.

DILL, in botany, the Engliſh name for the anethum of botaniſts. See the article ANETHUM.

DILLENIA, in botany, a genus of plants, whoſe flower conſiſts of five coriaceous, large, roundiſh, hollow petals, with a great number of ſtamina.

The fruit is roundiſh and externally covered with a number of oblong capſules; within there is a large column or pulpous receptacle.

The ſeeds are very ſmall and numerous, and ridulated underneath the capſules.

DIMACHÆ, in ancient military affairs, a kind of horſemen, anſwering to the dragoons of the moderns.

DIMENSION, in geometry, is either length, breadth, or thickneſs; hence a line hath one dimenſion, viz. length; a ſuperficies two, viz. length and breadth; and a body, or ſolid, has three, to wit, length, breadth, and thickneſs.

DIMENSION is alſo uſed with regard to the power of roots of an equation, which are called the dimenſions of that root; as in a cubic equation, the higheſt power has three dimenſions, &c.

DIMINISHED COLUMN, in architecture. See the article COLUMN.

DIMINISHED INTERVAL, in muſic, is a defective interval, or an interval that is ſhort of its juſt quantity, by a leſſer ſemitone, &c. See INTERVAL.

DIMINUTION, in architecture, a contraction of the upper-part of a column, by which its diameter is made leſs than that of the lower-part.

It generally commences from one third of the height of the column.

Vitruvius would have the diminution of columns different according to their height, and not according to their diameter: but this rule is not found to have been obſerved in the antique. Mr. Perrault obſerves, that a difference of orders does not infer a difference in diminutions, and Mr. Le Clerc ſays, all diminutions of columns ought to be more or leſs ſenſible, according as the orders are more or leſs delicate. For inſtance, in the Tuſcan order, where the column is fifteen modules high, the diminution under the aſtragal may be five minutes and a half. In the Doric order, where the column is ſixteen modules, the diminution may be but five minutes. In the Ionic, where the column is eighteen modules, the diminution may be but four minutes and a half; and in the Corinthian, no more than four. Diminutions are as differently adjuſted in antique buildings, as in different modern authors.

DIMINUTION, in heraldry, a term uſed for what the French call briſures, and we denominate differences.

DIMINUTIVE, in grammar, a word formed from ſome other, to ſoften or diminiſh the force of it, or to ſignify a thing is little in its kind.

DIMISSORY LETTERS, in the ancient Chriſtian church, were letters granted to the clergy, when they were to remove from their own dioceſe, and ſettle in another, to teſtify that they had the biſhop's leave to depart.

DIMOERITÆ, in church hiſtory, a name given to the Apollinarians, from their ſeparating the underſtanding from the human ſoul of Chriſt.

DIOCESE denotes a particular diſtrict, or diviſion, under the direction and government of a biſhop.

England, in regard to its eccleſiaſtical ſtate, is divided into two provinces, viz. Canterbury and York, and each province into ſubordinate dioceſes, of which there are twenty-two in England, and four in Wales.

DIOCLESIAN Epocha, in chronology. See the article Epocha.

DIONYSIA, in Grecian antiquity, ſolemnities in honour of Διονυσος, or Bacchus, ſometimes called by the general name of orgia; and by the Romans, bacchanalia, and liberalia.

DIONYSIAN Period, in chronology. See the article Period.

DIOECIA, the name of the twenty-ſecond claſs of plants in the Limnæan ſyſtem of botany, and comprehends all thoſe which have the male and female flowers on diſtinct plants of the ſame kind; in which reſpect, they bear ſome anology to quadrupeds, whoſe males and females are likewiſe diſtinct. To this claſs belong the poplar, willow, juniper, yew, ſpinack, &c. in all which the female plants alone produce ſeeds; but even theſe prove barren, unleſs planted near the male plants, ſo as to be within reach of the farina fœcundans. See Farina.

DIOPTER, Dioptra, a name ſometimes uſed for the hole pierced in ſights of mathematical inſtruments. See Sights.

DIOPTRA, among ſurgeons, the ſame with ſpeculum. See Speculum.

DIOPTRICS, the ſcience of refractive viſion, or that part of optics which conſiders the different refractions of light in its paſſing through different mediums, as air, water, glaſs, &c. and eſpecially lenſes.

DIOSCOREA, in botany, a genus of plants of the diœcia claſs, having no corolla in either the male or female flowers. The fruit is compreſſed and large, of a triangular form, containing three valves, and divided into three cells, each incloſing two compreſſed ſeeds, ſurrounded with a large membranaceous margin.

DIOSMA, in botany, a genus of pentandrious plants, whoſe flower conſiſts of five obtuſe petals of the length of the cup: the fruit is compoſed of five capſules adhering together, each encloſing a ſingle oblong acuminated ſeed.

DIOTA, a name uſed by ſome chemiſts for a circulating or double veſſel.

DIPHRYGES, in ancient pharmacy, the ſcoriæ, ſediment, or calx of melted copper, gathered in the furnace when the metal was run out.

DIPHTHONG, διφθογγος, in grammar, a double vowel, or the mixture of two vowels pronounced together, ſo as to make one ſyllable. See the article Vowel.

The Latins pronounced the two vowels in their diphthongs a e or æ, o e or œ, much as we do, only that the one was heard much weaker than the other, though the diviſion was made with all the delicacy imaginable. Diphthongs with regard to the eyes, are diſtinguiſhed from thoſe with regard to the ears: in the former, either the particular ſound of each vowel is heard in the pronunciation, or the ſound of one of them is drowned; or, laſtly, a new ſound, different from either, reſults from both: the firſt of theſe only are real diphthongs, as being ſuch both to the eye and the ear. Diphthongs with regard to the ear are either formed of two vowels meeting in the ſame ſyllable, or whoſe ſounds are ſeverally heard; or of three vowels in the ſame ſyllable, which only afford two ſounds in the pronunciation.

Engliſh diphthongs, with regard to the eye and ear, are *ai*, *au*, *ea*, *ee*, *oi*, *oo*, *ou*. Improper Engliſh diphthongs, with regard to the eye only, are *aa*, *ea*, *eo*, *eu*, *ie*, *ei*, *oa*, *oe*, *ue*, *ui*.

DIPHYES, among natural hiſtorians, an appellation given to ſtones reſembling the male and female parts of generation in mankind.

DIPLASIASMUS, in medicine, a reduplication of diſeaſes.

Diplasiasmus is alſo uſed for two muſcles of the arm, which ſerve to turn it round.

DIPLOE, in anatomy, the ſoft meditullium, or medullary ſubſtance, which lies betwixt the two laminæ of the bones of the cranium. See Cranium.

DIPLOMA, an inſtrument or licence given by colleges, ſocieties, &c. to a clergyman to exerciſe the miniſterial function, or to a phyſician to practiſe the profeſſion, &c. after paſſing examination, or admitting him to a degree.

DIPPING, among miners, ſignifies the interruption, or breaking off, of the veins of ore; an accident that gives them a great deal of trouble before they can diſcover the ore again.

DIPPING NEEDLE, a long ſtraight piece of ſteel, nicely poiſed on an axis parallel to the horizon, and afterwards touched with the load-ſtone, in order to diſcover the exact tendency of the magnetical virtue; in order to do which, the late truly ingenious Mr. George Graham made the following experiments at London, in the beginning of the year 1723.

The needle he made uſe of for this purpoſe, was twelve inches and one-tenth long, half an inch broad in the middle, but not above one-tenth near the extremities, which were filed to fine edges, and it was about one-third of a tenth thick. The ends of the axis, upon which the needle turned, were very ſmooth, and no bigger than was neceſſary for the ſupport of the needle, which weighed nine penny weight twenty-one grains, or about half an ounce Troy. The ends of the axis were placed upon the edges of two thin plates of ſteel, that were hard and well-poliſhed, and parallel to the horizon, that the needle, when vibrating, might roll, and not ſlide upon the edges of the plates, to avoid the friction they would have been liable to, by moving in holes. He provided a braſs ſemicircle, graduated from the loweſt point each way; and a few of the degrees about that part of the ſemicircle, that anſwered to the dip, were divided into ſix equal parts. By the help of ſcrews the ſemicircle could be brought to a due ſituation; and by two ſight levels, placed at right-angles to each other, any change of ſituation was eaſily perceived, and by the ſcrews it could be readily reſtored to its former poſition: all was incloſed with glaſs, to ſecure the needle from being diſturbed by the motion of the air. Here Mr. Graham takes notice of the great difficulty there is of poiſing the needle ſo exactly, before it is touched with the load-ſtone, as to take any poſition indifferently: for, when it is pretty near the truth, it is exceeding troubleſome to place it at reſt in the poſition deſired, in order to try which way it is inclined to move. It cannot be done in the open air; for, the leaſt motion thereof will diſturb the needle; and when it is ſhut up, it is no eaſy matter to ſettle it in the place intended. And that there will be a ſenſible difference of the dip, upon ſhifting to the ſides of the needle, whatever pains be taken to prevent it, Mr. Graham was fully ſatisfied from the following experiments.

Experiment 1. March 20, 1722. He touched both ſides of the end of the needle, he intended ſhould point ſouth, upon the north pole of a ſmall terrella; after which he cauſed it to vibrate in an arch of ten degrees, and reckoned the time by a pendulum clock, ſhewing ſeconds, till the needle had performed fifty vibrations.

	′	″
It performed the firſt 25 vibrations in	2	58
The next 25 vibrations in	2	27
The 50 in	5	25
Which gives for each vibration at a medium		6,5

The needle dipped 73° 15′

Exp. 2. Then he ſhifted the needle ſo to that ſide, which before reſpected the eaſt, was now turned weſt, and cauſing it to vibrate in the ſame arch, as before, it performed

	′	″
The firſt 25 vibrations in	2	49
The next 25 in	2	39
The 50 vibrations in	5	28
That is, each vibration in		6,56

The dip 73° 50′

Exp. 3. He now touched the ſame end of the needle a ſecond time on both ſides, upon the ſame ſtone, and ſuffering it to vibrate as before.

	′	″
It performed 25 vibrations in	2	49
That is, one vibration in		6,76

The dip 73° 20′

Exp. 4. The needle was now ſhifted, and ſtood as in the ſecond experiment.

	′	″
It performed 25 vibrations in	2	41
That is, one vibration in		6,44

Dip 73° 45′

Exp. 5. The ſame end of the needle being now touched twice on each ſide, with the loadſtone, preſented by the Lord Paiſley to the Royal Society, in the armour,

	′	″
It performed the firſt 25 vibrations in	1	58
The next 25 in	1	46
The 50 vibrations in	3	44
That is, each vibration in		4,48

The dip 73° 55′

Exp. 6. The needle being turned, and ſtanding as in the ſecond and fourth experiments, it performed

	′	″
The firſt 25 vibrations in	2	00
The next in	1	57
The 50 vibrations in	3	57
That is, each vibration in		4,74

The dip 74° 10′

Exp. 7. He now touched the needle at both ends with the ſame ſtone, with which it was touched in the fifth experiment, after which it performed

	′	″
The firſt 25 vibrations in	1	35
The next 25 in	1	34
The 50 in	3	9
That is, each vibration in		3,78

The dip 74° 20′

The dip repeated with the needle taken off and replaced 74° 20′ +

Exp. 8. Upon ſhifting the needle, it performed

	′	″
The firſt 25 vibrations in	1	33
The next 25 in	1	34
The 50 in	3	7

The dip 74° 25′

The dip repeated 74° 3′

N. B. The needle had the ſame ſide to the eaſt in the 1ſt, 3d, 5th, and 7th experiments; and had that ſide turned weſtward in the 2d, 4th, 6th, and 8th; and Mr. Graham began to count the vibrations, when he obſerved it to vibrate juſt ten degrees, as near as he could conjecture. All theſe experiments were made with ſufficient care in every particular, excepting the quantity of the dip, which requires the diviſions of the ſemicircle to be very equal, and the 90th degree to be perpendicular under the axis of the needle; this laſt he found was a little faulty, the dip being in reality greater than the ſemicircle ſhewed it. After he had rectified this error, and new touched the needle, upon that part of the armour to which iron is applied, when it is to be lifted by the ſtone, it performed the ſame number of vibrations in leſs time than in any of the former trials. He now determined to obſerve, for ſome conſiderable time, both the dip and vibrations, without freſh touching the needle.

He next proceeded to make ſeveral other obſervations, in the courſe of which he found the needle varied greatly, both in the quantity of the dip and in the times of vibration at different times. Vide *Philoſophical Tranſactions*, N°. 389.

The dipping needle was an invention of our countryman Mr. Blagrave, and has ſince been re-conſidered by ſeveral other ingenious gentlemen; particularly the late Mr. Whiſton, who made a great number of experiments therewith, in order to have diſcovered the longitude thereby, as the quantity of the dip is found to be different under different meridians; but the alteration was found too irregular to do any great feats this way.

DIPSACUS, teaſel, or teazel, in botany, a genus of plants, whoſe flowers conſiſting each of a tubular, erect petal, are collected in one common premanent perianthium; the receptacle is of a conical figure, beſet with long ſcales, and contains columnar ſeeds, having a marginaceous rim. One of the ſpecies of teaſel, is cultivated for uſe, being of ſingular ſervice in raiſing the knap on woollen cloth. It is propagated, by ſowing the ſeeds in March, and when come up are hoed out, as is practiſed with turnips, leaving them about ſix or eight inches aſunder: ſome time after they muſt be hoed again, enlarging their diſtance to at leaſt a foot. The ſecond year they will ſhoot up into heads, which will be fit to cut in Auguſt.

The leaves of wild teaſel are recommended againſt flatulencies and crudities of the ſtomach.

DIPSAS, in zoology, a ſpecies of ſerpent, ſo called from its bite creating a thirſt that proved mortal.

DIPTRE, or DIPTERON, in the ancient architecture, ſignified a temple ſurrounded with two rows of columns, which form a ſort of porticos, called wings, or iſles. Pſeudodiptere is the ſame, exept that inſtead of the double row of columns, this was only encompaſſed with a row of ſingle ones.

DIPTOTES, in grammar, are ſuch nouns as have only two caſes, as *ſuppetiæ*, *ſuppetias*, &c.

DIRECT, in arithmetic. The rule of three direct, is oppoſite to the rule of three inverſe. See the articles RULE OF THREE and PROPORTION.

DIRECT, in aſtronomy. A planet is ſaid to be direct, when it appears to an obſerver on the earth to go forward in the zodiac, or according to the ſucceſſion of the ſigns. See the article PLANET.

DIRECT RAY, in optics, is a ray flowing from a point of a viſible object directly to the eye, thro' one and the ſame medium.

DIRECT SPHERE. See SPHERE.

DIRECTION, in mechanics, ſignifies the line or path of a body's motion, along which it endeavours to proceed, according to the force impreſſed upon it.

ANGLE *of Direction*, that formed by the lines of direction of two conſpiring powers.

Quantity of DIRECTION, a term uſed by ſome mathematicians for the product of the velocity of the common center of gravity of a ſyſtem of bodies, by the ſum of their quantities of matter: this is nowiſe altered by any colliſions among the bodies themſelves.

Magnetical DIRECTION denotes the tendency of the load-ſtone, and other magnetic bodies, to certain points called their poles: thus, a magnetical needle always preſents one of its ends towards the north-pole of the world, and the other towards the ſouth-pole.

DIRECTOR, in commercial polity, a perſon who has the management of the affairs of a trading company: thus we ſay the directors of the India company, South-ſea company, &c.

DIRECTOR, in ſurgery, a grooved probe, to direct the edge of the knife or ſciſſars in opening ſinuſes, or fiſtulæ, that by this means the ſub-adjacent veſſels, nerves, and tendons, may remain unhurt.

DIRIGENT, or DIRECTRIX, a term in geometry, ſignifying the line of motion, along which the deſcribent line or ſurface is carried in the geneſis of any plane or ſolid figure.

DISBUDDING *of Trees*, ſignifies the taking away ſuch branches or ſprigs, newly put forth, as are ill-placed.

DISBURDENING *of Trees*, the taking off part of the leaves and fruit, when too numerous, that thoſe left may grow the larger.

DISC, *Diſcus*, in antiquity, a quoit made of ſtone, iron, or copper, five or ſix fingers broad, and more than a foot long, inclining to an oval figure, which they hurled in the manner of a bowl, to a vaſt diſtance, by the help of a leathern thong tied round the perſon's hand who threw it, and put through a hole in the middle.

DISC, in aſtronomy, the faces of the ſun and moon as they appear to an obſerver at the earth; alſo the face of the earth as it would appear to an obſerver in the moon, &c.

DISC, or diſk, in botany, is an aggregate of corollulæ, or partial flowers forming a circular plane in a compound flower.

DISC, in optics, is the width of the aperture of teleſcope glaſſes, whatever their form be, whether plane, convex, concave, &c.

DISCERNING, or DISCERNMENT, among logicians,

gicians, a faculty of the mind, whereby it diſtinguiſhes between ideas. See JUDGMENT and INTUITION.

DISCIPLE, one who learns any thing from another: thus, the followers of any teacher, philoſopher, &c. are called diſciples. In the Chriſtian ſenſe they were followers of Chriſt, in general; but in a more reſtrained ſenſe, the diſciples denote thoſe alone who were the immediate followers and attendants on his perſon, of which there were ſeventy or ſeventy-two.

DISCIPLINE, in a general ſenſe, ſignifies inſtruction and government, as military diſcipline, eccleſiaſtical diſcipline, &c.

Eccleſiaſtical diſcipline conſiſts in putting thoſe laws in execution by which the church is governed.

DISCLAIMER, in law, is a plea wherein is contained an expreſs denial of a thing; as where upon the diſtreſs of a lord, a tenant ſues a replevin, and the lord avows the taking, by alleging the tenant holds of him as of his lord, and that he diſtrained for the rent unpaid, or ſervice not performed: in this caſe, if the tenant denies that he holds of him, this is called a diſclaimer; and on that account, if the lord proves the tenant to hold of him, the tenant, on a writ of right, ſhall loſe his land.

DISCORD, in muſic, the relation of two ſounds which are always and of themſelves diſagreeable, whether applied in ſucceſſion or conſonance. Thus the ſecond, fourth, and ſeventh, with their octaves, and, in general, all intervals, except thoſe few which preciſely terminate the concords, are called diſcords. Diſcords are diſtinguiſhed into concinnous and inconcinnous intervals. See INTERVAL.

Concinnous DISCORDS, called by the ancients emmeli, are ſuch as are fit for muſic, next to and in combination with concords. Theſe are relations which in themſelves are neither very agreeable nor diſagreeable, and have only a good effect in muſic, as by their mixture and combination with the more natural and eſſential principles, they produce a variety neceſſary to our being better pleaſed.

Inconcinnous DISCORDS, by the ancients called ecmeli, are ſuch as are never choſen in muſic, as having too great a harſhneſs in them, though even the greateſt diſcord is not without its uſe. The eſſential principles of harmony, harmonical intervals, or concords, are in number only eight: the indefinite numbers of other ratios are all diſcords. Hence Mr. Malcolm ſhews the neceſſity of taking ſome of the leſs untoward of theſe diſcords into the ſyſtem of muſic.

The harmony of diſcords is that wherein the diſcords are made uſe of as the ſolid and ſubſtantial part of the harmony: for by a proper interpoſition of a diſcord, the ſucceeding concords receive an additional grace. Thus the diſcords are in muſic, what ſtrong ſhades are in painting. See the article HARMONY.

The diſcords are the fifth when joined with the ſixth, the fourth with the fifth. The ninth of its own nature is a diſcord; ſo is the ſeventh. The diſcords are introduced into harmony with due preparations, and muſt be ſucceeded by concords, which is the reſolution of diſcords.

DISCOVERY, in dramatic poetry, a manner of unravelling a plot, or fable, in tragedies, comedies, and romances, wherein, by ſome unforeſeen accident, a diſcovery is made of the name, fortune, quality, &c. of a principal perſon, which were before unknown. See CATASTROPHE.

DISCOUNT, in commerce, a term among traders, merchants, and bankers. It is uſed by the two former on occaſion of their buying commodities on the uſual time of credit, with a condition that the ſeller ſhall allow the buyer a certain diſcount at the rate of ſo much per cent. per annum, for the time for which the credit is generally given, upon condition that the buyer pays ready money for ſuch commodities, inſtead of taking the time of credit. Traders and merchants alſo frequently taking promiſſory notes for monies due, payable to them or order at a certain time; and ſometimes having occaſion for money before the time is elapſed, procure theſe notes to be diſcounted by bankers before the time of payment; which diſcount is more or leſs, according to the credit and reputation of the perſon who drew the note, and the indorſer or indorſers. Bills of exchange are alſo diſcounted by bankers; and in this conſiſts one article of the profits of banking.

DISCOUS FLOWERS, thoſe furniſhed with a diſc. See the article DISC.

DISCRETE, or DISJUNCT PROPORTION, is when the ratio of two or more pairs of numbers or quantities is the ſame, but there is not the ſame proportion between all the four numbers. Thus, if the numbers $3:6::8:16$ be conſidered, the ratio between $3:6$ is the ſame as that between $8:16$, and therefore the numbers are proportional; but it is only diſcretely or disjunctly, for 3 is not to 6 as 6 to 8; that is, the proportion is broken off between 8 and 3, and is not continued as in the following continual proportionals, $3:6::12:24$. See PROPORTION.

DISCRETE QUANTITY, ſuch as is not continuous and joined together. Such is a number whoſe parts being diſtinct units, cannot be united into one continuum; for in a continuum, there are no actual determinate parts before diviſion, but they are potentially infinite.

DISCRETIVE PROPOSITIONS, are thoſe where various judgments are made and denoted by the particles *but*, *notwithſtanding*, &c. either expreſſed or underſtood. Thus, "Fortune may deprive me of "my wealth, but not of my virtue," is a diſcretive propoſition.

DISCUS, in antiquity, an inſtrument uſed by the ancients in their public games.

DISCUSSION, in matters of literature, ſignifies the clear treating or handling of any particular point, or problem, ſo as to ſhake off the difficulties with which it is embarraſſed: thus we ſay, Such a point was well diſcuſſed, when it was well treated of, and cleared up.

Discussion, in a medicinal ſenſe, the ſame with diaphoreſis. See Diaphoresis.

DISCUTIENTS, in medicine, are ſuch remedies as, by their ſubtility, diſſolve a ſtagnating or coagulated fluid, and diſſipate the ſame, without an external ſolution of continuity.

DISDIAPASON, or Bisdiapason, in muſic, a compound concord, deſcribed by F. Parran, in the quadruple ratio of 4 : 1, or 8 : 2.

Disdiapason-Diapente, a concord in a ſextuple ratio of 1 : 6.

Disdiapason-Semi-Diapente, a compound concord in the proportion of 16 : 3.

Disdiapason-Ditone, a compound conſonance in the proportion of 10 : 2.

Disdiapason-Semi-Ditone, a compound concord in the proportion of 24 : 5.

DISEASE, in medicine, that ſtate of a living body wherein it is deprived of the exerciſe of any of its functions, whether vital, natural, or animal.

Endemic Diseases. See the article Endemic.

Epidemic Diseases. See Epidemic *Diſeaſes.*

DISFRANCHISING, among civilians, ſignifies the depriving a perſon of the rights and privileges of a free citizen or ſubject.

DISGORING, in the manege, the diſperſing an inflammation or ſwelling.

DISGUISE, a counterfeit habit. Perſons doing unlawful acts in diſguiſe, are by our ſtatutes ſometimes ſubjected to great penalties, and even declared felons. Thus by an act, commonly called the Black Act, perſons appearing diſguiſed and armed in a foreſt, or grounds incloſed, or hunting deer, or robbing a warren or a fiſh-pond, are declared felons.

DISH, among miners, denotes a wooden meaſure, wherein they are obliged to meaſure their ore; it is kept by the bar-maſter, and contains about 672 ſolid inches.

DISJUNCTIVE, ſomething that ſeparates or disjoins. Thus, *or*, *neither*, &c. which in connecting a diſcourſe yet ſeparate the parts of it, are called disjunctive conjunctions.

Disjunctive Proposition, in logic, is that whereof ſeveral predicates we affirm one neceſſarily to belong to the ſubject, to the excluſion of all the reſt, but leave that particular one undetermined. Such is the major of the following disjunctive ſyllogiſm.

> The world is either ſelf-exiſtent, or the work of ſome finite, or of ſome infinite, being.
>
> But it is not ſelf-exiſtent, nor the work of a finite being.
>
> Therefore it is the work of an infinite being.

DISK, or Disc. See the article Disc.

DISLOCATION, in ſurgery, the ſame with luxation. See Luxation.

DISMEMBERED, in heraldry, is applied to birds that have neither feet nor legs, and alſo to lions and other animals whoſe members are ſeparated.

DISMOUNTING, in the military art, the act of unhorſing. Thus, to diſmount the cavalry, dragoons, &c. is to make them alight.

Dismounting Cannon, is the breaking their carriages, wheels, axle-trees, or any thing elſe, ſo as to render them unfit for ſervice.

DISPART, in gunnery, is the ſetting a mark upon the muzzle ring, or thereabouts, of a piece of ordnance, ſo that a ſight-line taken upon the top of the baſe-ring againſt the touch-hole, by the mark ſet on or near the muzzle, may be parallel to the axis of the concave cylinder. The common way of doing this, is to take the two diameters of the baſe-ring, and of the place where the diſpart is to ſtand, and divide the difference between them into two equal parts, one of which will be the length of the diſpart which is ſet on the gun with wax or pitch, or faſtened there with a piece of twine or marlin. By means of an inſtrument it may be done with all poſſible nicety.

DISPENSARY, or Dispensatory, denotes a book containing the method of preparing the various kinds of medicines uſed in pharmacy. Such are thoſe of Bauderon, Quercetan, Zwelfer, Charas, Bates, Meſue, Salmon, Lemery, Quincy, &c. but the lateſt and moſt eſteemed are the Edinburgh and London Diſpenſatories.

Dispensary, or Dispensatory, is likewiſe a magazine or office for ſelling medicines at prime coſt to the poor.

DISPENSATION, in law, the granting a licence of doing ſome certain action that otherwiſe is not permitted.

DISPERSION, in general, ſignifies the ſcattering or diſſipating ſomething. Hence,

Dispersion, in optics, the ſame with divergency, which ſee.

Point of Dispersion, in dioptrics, the point from whence refracted rays begin to diverge.

Dispersion *of Inflammations*, in medicine and ſurgery, is the removing the inflammation, and reſtoring the inflamed part to its natural ſtate.

DISPONDEE, *Diſpondæus*, in the Greek and Latin poetry, a double ſpondee or foot, conſiſting of four long ſyllables, as θαυμαζοντων, māēcēnātēs, cōnclūdēntēs.

DISPOSITION, in architecture, the juſt placing the ſeveral parts of an edifice, according to their proper nature and office.

Disposition, in rhetoric, the placing words in ſuch an order as contributes moſt to the beauty and ſometimes even to the ſtrength of a diſcourſe.

DISPROPORTION, a general term for any

kind of irregularity, or want of proportion in the parts of a thing.

DISSECTION, in anatomy, the cutting up a body, with a view of examining the ſtructure and uſe of the parts. See the article ANATOMY.

DISSEISIN, in law, an unlawful diſpoſſeſſing a perſon of his lands or tenements. It is of two ſorts, either ſingle diſſeiſin, which is committed without force of arms, or diſſeiſin by force of arms, more properly termed deforcement.

The diſturbing a perſon from entering on his land, or hindering him from tilling it, are both diſſeiſins of land; and denial of rent, when lawfully demanded, is a diſſeiſin of the rent.

DISSENTERS, ſeparatiſts from the ſervice and worſhip of the church of England.

DISSIMILAR, in general, an appellation given to things which are unlike: thus the ſeminal or firſt leaves of plants, are called diſſimilars, as being generally of a different figure from thoſe of the grown plants.

DISSIMILAR PARTS, in anatomy, thoſe compounded of parts of various ſtructure, ſuch are all the limbs of the body.

DISSIMILITUDE, in general, denotes whatever conſtitutes the difference between two diſſimilar things. See DISSIMILAR and SIMILITUDE.

DISSIMILITUDE, in rhetoric, an argument wherein from diſſimilar unlike things, other diſſimilars are deduced.

DISSIPATION, in phyſics, an inſenſible loſs or conſumption of the minute parts of the body; or that flux whereby they fly off, and are loſt.

Circle of DISSIPATION, in optics, is uſed for that circular ſpace upon the retina, which is taken up by one of the extreme pencils or rays iſſuing from an object.

The conſideration of the circles of diſſipation, formed by the rays coming from the extremities of objects, is of uſe to account for ſeveral curious phenomena of viſion. *Smith's Optics.*

Univerſal DISSOLVENT. See the article ALKAHEST.

DISSOLUTION, in chemiſtry, the ſame with ſolution. See the article SOLUTION.

DISSOLUTION, in muſic, is when a ſound in the enharmonic genus is lowered three dieſes; for thereby that genus is diſſolved, and the muſic, or that interval at leaſt, is chromatic.

DISSONANCE, in muſic, the ſame with diſcord. See the article DISCORD.

DISSYLLABLE, among grammarians, a word conſiſting only of two ſyllables: ſuch are nature, ſcience, &c.

DISTAFF, an inſtrument about which flax is tied in order to be ſpun.

DISTANCE, the interval between two things, either with regard to time, place, or quantity. Thus we ſay, the diſtance of the creation of the world, from the nativity of Jeſus Chriſt, is upwards of 4000 years: the diſtance between the Creator and creature is infinite.

DISTANCES, in geometry, are meaſured by the chain, decempena, and the like. See CHAIN.

DISTANCE, in geography, is the arch of a great circle interſected between two places.

DISTANCE, in navigation, is the number of miles, or leagues, that a ſhip has ſailed from any point. See SAILING.

DISTANCE, in aſtronomy. The diſtance of the ſun, planets, and comets, is found from the parallax.

That of the fixed ſtars, as having no ſenſible parallax, we can do little more than gueſs at.

DISTANCE *of the Sun from the Moon's Node, or Apogee*, is an arch of the ecliptic intercepted between the ſun's true place and the moon's node, or apogee. See NODE.

DISTANCE *of the Eye*, in perſpective, is a line drawn from the eye to the principal point.

Curtate DISTANCE, in aſtronomy, is the diſtance of the planet's place, reduced to the ecliptic, from the ſun.

Point of DISTANCE, in perſpective, is a point in the horizontal line at ſuch a diſtance from the principal point, as is that of the eye from the ſame.

DISTANCE *of the Baſtions*, in fortification, is the ſide of the exterior polygon. See POLYGON.

DISTASTE, properly implies an averſion or diſlike to certain foods, and may be either conſtitutional, or owing to ſome diſorder of the ſtomach; in which laſt caſe emetics are recommended.

DISTEMPER, among phyſicians, the ſame with diſeaſe. See DISEASE.

DISTEMPER, in painting, a term uſed for working up of colours with ſomething beſides water or oil. If the colours are prepared with water, that kind of painting is called limning; and if with oil, it is called painting in oil, and ſimply painting. If the colours are mixed with ſize, whites of eggs, or any ſuch ſuch proper glutinous, or unctuous matter, and not with oil, then they ſay it is done in diſtemper.

DISTICH, διστιχον, a couplet of verſes making a compleat ſenſe. Thus hexameter and pentameter verſes are diſpoſed in diſtichs.

DISTICHIASIS, in ſurgery, a diſeaſe of the eye-lids, when under the ordinary eye-laſhes there grows another extraordinary row of hair, which frequently eradicates the former, and pricking the membrane of the eye, excites pain, and brings on a defluxion. It is cured by pulling out the ſecond row of hairs with nippers, and cauterizing the pores out of which they iſſued.

DISTILLATION is the condenſing and collecting

ing in a fluid form, by a proper apparatus, the ſteam or vapour of bodies previouſly rarified, by the application of heat.

The word is derived from the Latin, *diſtillo*, to drop leiſurely.

The principle on which this operation is formed, is too obvious to demand any illuſtration; ſince the evaporation of fluids by heat, and their reduction into their former ſtate, as they grow cold again, are facts which fall within the notice of every one.

The firſt ſubject of caution, in regard to diſtillation, is to take care to leave ſufficient room, in the containing veſſel, or body, for the expanſion and ebullition of the matter to be diſtilled; otherwiſe, it is very apt to overflow in the neck, and break the veſſels, if of glaſs; hazard the firing the building, in the caſe of vinous ſpirits, and fruſtrate the operation in all. This is to be particularly guarded againſt in the diſtillation of aqua-fortis and ſpirit of ſalt by Glauber's method, and of amber; as alſo in the rectification of the ſpirit of hartſhorn; all of which, eſpecially in the beginning of the operation, are extremely ſubject to make a very great ebullition, and to froth up in the neck of the retort. In theſe caſes, therefore, at leaſt one-third of the retort ſhould be left unfilled; and even then, without a very careful management of the fire, they are not exempt from danger. Another requiſite caution is, that the condenſing ſurface be ſufficiently large, and the heat accommodated to it; for if an error of this kind occur in the caſe of the worm-ſtill, the head will be blown off, and the vapour diſſipated, with conſiderable loſs; and if in that of vinous ſpirits, to the great danger of thoſe who may happen to be in the place.

It is neceſſary, likewiſe, in diſtillation, as well as digeſtion, to avoid luting the veſſels too cloſely with any tenacious ſubſtance; for if a ſufficient vent be not left for the eſcape of the air, which is generated during the diſtillation of ſome kinds of ſubſtances, as alſo for the expanſion, which attends the increaſe of heat of that air which is included in the veſſels at the time of their junction, the veſſels will be in extreme danger of being burſt with great violence.

DISTILLERY, the art of diſtilling brandies and other ſpirits.

DISTINCT NOTION, or IDEA, is that wherein the mind perceives a difference from all other ideas.

DISTINCT BASE, in optics, is that diſtance from the pole of a convex glaſs, in which objects beheld through it appear diſtinct and well deſcribed, ſo that it is the ſame with the focus. See FOCUS.

DISTINCTION, in logic, is an aſſemblage of two or more words, whereby different things, or their conceptions, are denoted.

DISTORTER ORIS, in anatomy, a muſcle otherwiſe called zygomaticus. See the article ZYGOMATICUS.

DISTRAINING, in law, the ſame with attaching. See the article ATTACHING.

DISTRESS, in law, the ſeizing or diſtraining any thing for rent in arrear, or other duty unperformed.

DISTRIBUTION, in architecture, the dividing and diſpenſing the ſeveral parts and pieces which compoſe a building, as the plan directs.

DISTRIBUTION, in logic, is a kind of diviſion which diſtinguiſhes an univerſal whole into its ſeveral kinds of ſpecies; as diviſion is to diſtinguiſh an integral whole into its ſeveral parts.

DISTRIBUTION, in rhetoric, a kind of deſcription, whereby an orderly diviſion and enumeration is made of the principal qualities of the ſubject.

DISTRIBUTION, in printing, the taking a form aſunder, ſeparating the letters, and diſpoſing them in the caſes again, each in its proper cell. See PRINTING.

DISTRIBUTIVE JUSTICE is that whereby we give every perſon what properly belongs to him.

DISTRICT, in geography, a part of a province, diſtinguiſhed by peculiar magiſtrates, or certain privileges; in which ſenſe it is ſynonimous with hundred. See the article HUNDRED.

DITCH, in country affairs, a narrow channel or trench made for draining marſhy grounds, the conveyance of water, or incloſing fields.

DITHYRAMBIC, ſomething belonging to the dithyrambus, as a dithyrambic verſe, a dithyrambic poet, &c.

The dithyrambic poetry was very bold and irregular, for the poets not only took the liberty to forge new words for the purpoſe, but made double and compound words, which contributed very much to the magnificence of this ſort of poetry.

DITHYRAMBUS, in ancient poetry, a hymn in honour of Bacchus, full of tranſport and poetical rage.

DITONE, in muſic, an interval comprehending two tones.

DITRIGLYPH, in architecture, the ſpace between two triglyphs. See TRIGLYPH.

DITTANDER, in botany. See the article LEPIDIUM.

DITTANY, *Dictamnus*, in botany. See DICTAMNUS.

DITTO, uſually written D°. in books of accounts, an Italian word, ſignifying the aforementioned.

DIVALIA, the ſame with angeronalia. See the article ANGERONALIA.

DIVAN, a council-chamber, or court of juſtice, among the eaſtern nations, particularly the Turks.

Divan-Beghi, the ſuperintendant of juſtice in Perſia, whoſe place is the laſt of the ſix miniſters of the ſecond rank, who are all under the athemadaulet, or firſt miniſter.

DIVERGENT, or Diverging Lines, in geometry, are thoſe which conſtantly recede from each other.

Divergent Rays, in optics, are thoſe which, going from a point of the viſible object, are diſperſed, and continually depart one from another, in proportion as they are removed from the object.

Point of DIVERGENCY, the ſame with that of diſperſion, which ſee.

DIVERSIFYING, among orators, is the handling a ſubject different ways, in order to throw new light on it, and enforce it the ſtronger on the hearers.

DIVERSION, in military affairs, is when an enemy is attacked in one place where they are weak and unprovided, in order to draw off their forces from making an irruption ſomewhere elſe. Thus the Romans gave a diverſion to Hannibal from Italy, by their attacking Carthage.

Diversion, in phyſic, is when by means of medicines an attempt is made to give a different turn to the flux of humours; thus blood-letting makes a great diverſion.

DIVIDEND, in arithmetic, is the number propoſed to be divided into a certain number of equal parts.

DIVINATION is the knowledge of things obſcure or future, which cannot be attained by any natural means.

The word is derived from the Latin, *divino*, to divine or foretel.

DIVING, the art or act of deſcending under water to conſiderable depths, and abiding there a competent time; the uſes of which are particularly in fiſhing for pearls, corals, ſponges, wrecks of ſhips, &c.

There have been various engines contrived to render the buſineſs of diving ſafe and eaſy; the great point is to furniſh the diver with freſh air, without which he muſt either make but a ſhort ſtay, or periſh. Thoſe who dive for ſponges in the Mediterranean, carry down ſponges dipped in oil in their mouths. But conſidering the ſmall quantity of air that can be contained in the pores of a ſponge, and how much that little will be contracted by the preſſure of the incumbent air, ſuch a ſupply cannot ſubſiſt a diver long, ſince a gallon of air is not fit for reſpiration above a minute. Dr. Halley aſſures us, a naked diver cannot ſubſiſt above two minutes under water, with or without a ſponge: beſides, if the depth be conſiderable, the preſſure of the water makes the eyes blood-ſhot, and frequently occaſions a ſpitting of blood. One Drebell, in the reign of James I. invented a machine to be rowed under water, carrying twelve rowers, beſides paſſengers, and a liquor to be carried in the veſſel, which ſupplied the place of freſh air.

Diving-Bell, is a machine for the ſafe conveyance of a diver to any reaſonable depth under water, and in ſuch manner that he may ſtay for ſome conſiderable time.

The diving-bell is moſt conveniently made in form of a truncated cone, the ſmaller baſis being cloſe, and the larger open, and to be ſo poiſed with lead and ſo ſuſpended, as that the veſſel may ſink full of air with its open or larger baſis downwards, and as near as poſſible, in a poſition parallel to the horizon, ſo as to cloſe with the ſurface of the water all at once: Under this receptacle the diver ſinks down together with the included air into the depth deſired; and if the cavity of the veſſel contain a tun of water, a ſingle man may remain therein at leaſt an hour, without much inconvenience, at five or ſix fathoms depth; but this included air, as it deſcends lower, contracts itſelf according to the weight of the water that compreſſes it; ſo as that at 33 feet deep, or thereabouts, the bell will be half full of water, the preſſure thereof being then equal to that of the whole atmoſphere; and at all other depths, the ſpace poſſeſſed by the compreſſed air in the upper part of the bell will be to the under part of its capacity filled with water, at 33 feet to the depth of the ſurface of the water in the bell below the common ſurface thereof; and this condenſed air, being taken in with the breath, ſoon inſinuates itſelf into all the cavities of the body, and has no ſenſible effect, if the bell be permitted to deſcend ſo ſlowly as to allow time for that purpoſe; the only inconvenience that attends it is found in the ears, within which there are cavities opening only outwards, and that by pores ſo ſmall, as not to give admiſſion even to the air itſelf, unleſs dilated by a conſiderable force: Hence on the firſt deſcent of the bell a preſſure begins to be felt on each ear, which by degrees grows painful, as if a quill were forcibly thruſt into the hole of the ear; till at length the force overcoming the obſtacle, that which conſtringes theſe pores yields to the preſſure, and letting ſome condenſed air ſlip in, preſent eaſe enſues; but the bell deſcending ſtill lower, the pain is renewed, and again eaſed after the ſame manner: on the contrary, when the engine is drawn up again, the condenſed air finds a much eaſier paſſage out of thoſe cavities and even without pain; this force on the auditory paſſages might poſſibly be ſuſpected to be prejudicial to the organs of hearing, but experience teaches the contrary; but what is more inconvenient in this engine is the water entering into it, ſo as to contract the bulk of air, according to the aforeſaid rule, into ſo ſmall a ſpace, as that it ſoon heats and becomes unfit for reſpiration, for which reaſon it muſt be often drawn up to recruit again; and beſides, the diver, being almoſt covered with the water thus entering into his receptacle, will not be long able to endure the cold thereof.

To obviate theſe difficulties, which attend the uſe of the common diving-bell, the late Dr. Halley contrived means to convey air down to it, whilſt below; whereby not only the included air was renewed and recruited, but alſo the water entirely driven out, at whatever depth it happened to be; and this he effected by an eaſy contrivance, which may furniſh air at the bottom of the ſea in any quantity deſired; the deſcription of the apparatus is as follows.

The bell, he made uſe of, was of wood, containing about 60 cubic feet in its concavity, and of the form of a truncated cone, whoſe diameter at top was three feet, and at the bottom five: this he coated with ſo much lead, as that it would ſink empty, and he diſtributed the weight in ſuch a manner about its bottom, that it would go down in a perpendicular poſition and no other; in the top he fixed a ſtrong but clear glaſs, as a window to let in the light from above; and likewiſe a cock to let out the hot air that had been breathed; and below, about a yard under the bell, he placed a ſtage, which hung by three ropes, each of which was charged with about 100 weight, to keep it ſteady; this machine he ſuſpended from the maſt of a ſhip, by a ſprit, which was ſufficiently ſecured by ſtays to the maſt-head, and was directed by braces to carry it over-board, clear of the ſhip's ſide, and to bring it again within-board, as occaſion required.

To ſupply air to this bell, when under water, he cauſed a couple of barrels, of about 36 gallons each, to be caſed with lead, ſo as to ſink empty; each having a bung hole in its loweſt part, to let in the water, as the air in them condenſed on their deſcent, and to let it out again, when they were drawn up full from below; and to a hole in the uppermoſt part of theſe barrels he fixed a leathern trunk or hoſe, well liquored with bees-wax and oil, and long enough to fall below the bung-hole, kept down by a weight appended; ſo that the air in the upper part of the barrels could not eſcape, unleſs the lower ends of theſe hoſe were firſt lifted up.

The air-barrels being thus prepared, he fitted them with tackle proper to make them riſe and fall alternately, after the manner of two buckets in a well; which was done with ſo much eaſe, that two men with leſs than half their ſtrength, could perform all the labour required; and in their deſcent they were directed by lines, faſtened to the under edge of the bell, which paſſed through rings placed on both ſides the leathern hoſe in each barrel; ſo that ſliding down by thoſe lines, they came readily to the hand of a man, who ſtood on the ſtage on purpoſe to receive them, and to take up the ends of the hoſe into the bell; through theſe hoſe, as ſoon as their ends came above the ſurface of the water in the barrels, all the air included in the upper parts was blown with great force into the bell, whilſt the water entered at the bung-holes below, and filled them; and as ſoon as the air of the one barrel had been thus received, upon a ſignal given, that was drawn up, and at the ſame time the other deſcended; and by an alternate ſucceſſion furniſhed air ſo quick, and in ſo great plenty, that the Dr. himſelf was one of five who had been together at the bottom, in nine or ten fathoms water, for above an hour and a half at a time, without any ſort of bad conſequence; and he might have continued there as long as he pleaſed, for any thing that appeared to the contrary; beſides, the whole cavity of the bell was kept entirely free from water; ſo that he ſat on a bench, diametrically placed near the bottom, being quite dreſſed with all his cloaths on: he only obſerved, that it was neceſſary to be let down gradually at firſt, as about twelve foot at a time, and then to ſtop and drive out the water that entered, by receiving three or four barrels of freſh air, before he deſcended farther; but being arrived at the depth deſigned, he then let out as much of the hot air, that had been breathed, as each barrel would repleniſh with cold air, by means of the cock at the top of the bell; through whoſe aperture, though very ſmall, the air would ruſh with ſo much violence, as to make the ſurfaces of the ſea boil, and cover it with a white foam, notwithſtanding the great weight of water over him.

Thus the Dr. found he could do any thing that was required to be done juſt under him; and that, by taking off the ſtage, he could, for a ſpace as wide as the circuit of the bell, lay the bottom of the ſea ſo far dry, as not to be over ſhoes thereon; and by the glaſs window, ſo much light was tranſmitted, that, when the ſea was clear, and eſpecially when the ſun ſhone, he could ſee perfectly well either to read or write, much more to faſten or lay hold on any thing under him that was to be taken up; and by the return of the air-barrels, he has often ſent up orders, written with an iron pen on ſmall plates of lead, directing how to move him from place to place, as occaſion required; at other times when the water was troubled and thick, it would be below as dark as night; but in ſuch a caſe, he could keep a candle burning in the bell, as long as he pleaſed, notwithſtanding the great expence of air requiſite to maintain flame.

Diving-Bladder, a term uſed by Borelli for a machine which he contrived for diving under water to great depths, with great facility, and prefers to the common diving-bell. The veſica, or bladder, as it is uſually called, is to be of braſs or copper, and about two feet in diameter. This is to contain the diver's head, and is to be fixed to a goat's ſkin habit, exactly fitted to the ſhape of the body of the perſon. Within this veſica there are pipes, by means of which a circulation of air is contrived; and the perſon carries an air-pump by his ſide, by means of which he may make himſelf heavier or lighter, as the fiſhes do by contracting or dilating

lating their air-bladder: by this means the objections all other diving machines are liable to, are obviated, and particularly that of the air; the moiſture by which it is clogged in reſpiration, and by which it is rendered unfit for the ſame uſe again, being here taken from it by its circulation through the pipes, to the ſides of which it adheres, and leaves the air as free as before. *Borelli Opera Poſthuma.*

DIVISIBILITY, in phyſics, is that diſpoſition of a body whereby it is conceived to have parts, into which it may be actually or mentally divided; and that this may be done, the very extenſion of a body, without which it cannot be ſaid to exiſt, naturally implies.

That bodies are diviſible, few will diſpute, but that they are diviſible, *ad infinitum*, has been diſputed by many, and that by very able and learned men; however we think that the truth of the following geometrical demonſtration, is beyond doubt manifeſt.

Let there be a line A D perpendicular to B F, (Plate XLIII. *fig.* 1.) and another as G H at a ſmall diſtance from A, alſo perpendicular to the ſame Line, with the centers C, C, C, &c. and diſtances CA, CA, &c. deſcribe circles cutting the line G H in the points *e*, *e*, &c. The greater the radius AC is, the leſs is the part *e* G; the radius may be augmented *in infinitum*, and therefore the part *e* G may be diminiſhed in the ſame manner; and yet it can never be reduced to nothing; becauſe the circle can never coincide with the right line B F.

Therefore the parts of any magnitude may be diminiſhed *in infinitum*, and there is no end of ſuch a diviſion.

The ſame thing may be proved by a great many other mathematical demonſtrations.

The chief objections are,—That an infinite cannot be contained by a finite;—that it follows from a diviſibility *in infinitum*, that all bodies are equal, or, that one infinite is greater than another.

But theſe are eaſily anſwered; for to an infinite may be attributed the properties of a finite and determined quantity. Who has ever proved that there could not be an infinite number of parts infinitely ſmall in a finite quantity; or that all infinites are equal? The contrary is demonſtrated by mathematicians in innumerable inſtances.

There are alſo other objections propoſed, ſuppoſing that we affirm an actual diviſion of a body into an infinite number of parts ſeparated from one another. We neither defend nor conceive ſuch a diviſion: we have demonſtrated, that however ſmall a body is, it may ſtill be farther divided; and, upon that account, we believe that we may call that a diviſion *in infinitum*, becauſe what has no limits is called *infinite*.

There are no ſuch things as parts infinitely ſmall; but yet the ſubtilty of the particles of ſeveral bodies is ſuch, that they very much ſurpaſs our conception; and there are innumerable inſtances in nature of ſuch parts that are actually ſeparated from one another.

Mr. Boyle has proved it by ſeveral arguments.

He ſpeaks of a ſilken thread 300 yards long, that weighed but two grains and a half.

He meaſured leaf-gold, and found by weighing it, that 50 ſquare inches weighed but one grain: if the length of an inch be divided into 200 parts, the eye may diſtinguiſh them all; therefore there are in one ſquare inch 40000 viſible parts; and in one grain of gold there are two millions of ſuch parts; which viſible parts no one will deny to be farther diviſible.

A whole ounce of ſilver may be gilt with eight grains of gold, which is afterwards drawn into a wire thirteen thouſand foot long.

In odoriferous bodies we can ſtill perceive a greater ſubtilty of parts, and which are ſeparated from one another; ſeveral bodies ſcarce loſe any ſenſible part of their weight in a long time, and yet continually fill a very large ſpace with odoriferous particles: whoever will be at the pains to make calculations concerning thoſe ſubtile effluvia, will find the number of parts to be amazing.

By help of microſcopes, ſuch objects as would otherwiſe eſcape our ſight, appear very large: there are ſome ſmall animals ſcarce viſible with the beſt microſcopes; and yet theſe have all the parts neceſſary for life, blood and other liquors: how wonderful muſt the ſubtilty of thoſe particles be, which make up ſuch fluids!

We cannot end this chapter more aptly than by the following theorem, which is eaſily deduced from what has been ſaid of the ſubtilty of matter.

THEOREM.

Any particle of matter, how ſmall ſoever, and any finite ſpace, how large ſoever, being given; it is poſſible that that ſmall ſand, or particle of matter, ſhall be diffuſed through all that great ſpace, and ſhall fill it in ſuch manner that there ſhall be no pore in it, whoſe diameter ſhall exceed a given line.

DIVISION, in arithmetic, is a method of determining how often one number or quantity is contained in another: and here it may be noted, that the number or quantity to be divided is called the dividend; that number or quantity by which it is to be divided is called the diviſor, and the number ſhewing how many times the diviſor is contained in the dividend, and which is that found by the operation, is called the quotient.

Hence it appears that by diviſion we may perform, at one operation, what would require a multitude of ſubtractions, and in whole numbers is performed thus:

Suppoſe it was required to divide 63 by 7, ſeek how many times 7 is contained in 63, and there will come out preciſely 9 for the quotient; and conſequently $\frac{63}{7}$ is equal to 9. Moreover, to divide 371 by 7, prefix the diviſor 7, and beginning at the firſt figures of the dividend, coming as near them as poſſible, ſay, how many times 7 is contained in 37, and you will find 5: then writing 5 in the quotient, ſubtract 5×7, or 35 from 37, and there will remain 2, to which ſet the laſt figure of the dividend, viz. 1, and then 21 will be the remaining part of the dividend for the next operation; ſay therefore as before, how many times 7 is contained in 21, and the anſwer will be 3; wherefore writing 3 in the quotient, take 3×7, or 21, from 21, and there will remain 0. Whence it is manifeſt, that 53 is preciſely the number that ariſes from the diviſion of 371 by 7.

```
7)371(53
  35
  ----
   21
   21
   .0
```

And thus to divide 4798 by 23; firſt beginning with the initial figures 47, ſay, how many times is 23 contained in 47, anſwer 2; wherefore write 2 in the quotient, and from 47 ſubtract 4×23, or 46, and there will remain 1, to which join the next number of the dividend, viz. 9, and you will have 19 to work upon next. Say, therefore, how many times is 23 contained in 19, anſwer 0; wherefore write 0 in the quotient; and from 19 ſubtract 0×23, or 0, and there remains 19, to which join the laſt number 8, and you will have 198 to work upon next; wherefore in the laſt place ſay, how many times is 23 contained in 198, which may be gueſſed at from the firſt figures of each, 2 and 19, by taking notice how many times 2 is contained in 19) I anſwer 8; wherefore write 8 in the quotient, and from 198 ſubtract 8×23, or 184, and there will remain 14 to be farther divided by 23; and ſo the quotient will be $208\frac{14}{23}$. And if this fraction is to be avoided, you muſt continue the diviſion in decimal fractions, by adding always a cypher to the remaining number. Thus to the remainder 14 add 0, and it becomes 140: then ſay how many times 23 in 140, anſwer 6; write therefore 6 in the quotient; and from 140 ſubtract 6×23, or 138, and there will remain 2; to which ſet a cypher (or 0) as before; and thus the work being continued at pleaſure, there will at length ariſe this quotient, viz. 208,6086.

```
23) 4798 (208,6086, &c.
    46
    ----
     19
     00
     ----
     198
     184
     ----
      140
      138
      ----
        20
        00
        ----
        200
        184
        ----
         160
```

Division of decimal fractions, is in every reſpect the ſame as in whole numbers; care being had to prick off as many places in the quotient for a decimal, as the dividend hath more than the diviſor, as will more fully appear from the following example:

Divide the decimal fraction 3,27579 by 24,63, and the quotient will be ,133, which muſt be all decimals; for there are five places of decimals in the dividend, and but two in the diviſor; therefore the difference 3, is the number of places to be pricked off in the quotient.

```
24,63)3,27579(,133
      2463
      ----
       8127
       7389
       ----
        7389
        7389
        ----
           0
```

But if either or both of the factors be interminate or circulating decimals, obſerve the following rules. See the articles Circulate and Interminate.

1. When the dividend is a circulate, and there be occaſion to continue it to a greater number of places, it muſt be done with the proper figures belonging to that fraction, whether ſimple or compound.

2. When the diviſor is an interminate, the firſt product thereof, when placed under the dividend, muſt be continued to an equal length therewith; and when ſubtracted, it will produce a new dividend; and the ſame method muſt be repeated, as often as any figures are continued in the quotient.

3. If a perfect number be to be divided by an interminate one, let the dividend end in a cypher, elſe the firſt ſubtraction may ſometimes prove wrong.

Theſe rules will be further illuſtrated by the following examples.

Example 1.

```
,1572916)133,0687500(846
         125 8333333
         -----------
           7 2354166
           6 2916666
           ---------
             9437500
             9437500
             -------
                   0
```

Ex. 2.

```
,0625),270270270(4.32432. &c.
       2500
       ----
        2027
        1875
        ----
         1520
         1250
         ----
          2702
          2500
          ----
           2027
           1875
           ----
            1520
            1250
            ----
             270
```

Division of vulgar fractions is performed as follows.

1. If either factor be either a whole or mixed number, reduce it to an improper fraction.

2. If either or both be compound ones, reduce them to ſimple ones.

3. Reduce both factors to their loweſt terms; and then,

4. Divide the numerator and denominator of the dividend, by the numerator and denominator of the diviſor reſpectively; if this can be done without any remainder: but as this can ſeldom happen, the general rule is, multiply the denominator of the diviſor by the numerator of the dividend for the numerator of the quotient, and the denominator of the dividend by the numerator of the diviſor for the denominator of the quotient, and place theſe fraction-wiſe, and the work is done.

Examples.

Divide $\frac{8}{117}$ by $\frac{4}{13}$, and the quotient will be $\frac{2}{9}$, for

$$\left.\begin{array}{lr} 8 \text{ divided by } 4, \text{ gives} & 2 \\ \qquad\text{and} & - \\ 117 \text{ divided by } 13, \text{ gives} & 9 \end{array}\right\}\text{ the anſwer.}$$

Divide $\frac{2}{5}$ by 7 a whole number.

7 expreſſed in a vulgar fraction is $\frac{7}{1}$, and 7 multiplied by 5, gives 35 for a denominator; and 2 multiplied by 1, gives 2 for the numerator; therefore $\frac{2}{35}$ is the true quotient.

Divide $5\frac{3}{4}$ by $\frac{2}{3}$ of $\frac{3}{4}$.

For $5\frac{3}{4}$ reduced to an improper fraction is $\frac{23}{4}$, and the compound fraction $\frac{2}{3}$ of $\frac{3}{4}$, reduced to a ſimple one, is $\frac{1}{2}$; whence, by the former part of rule 4th, $\frac{23}{2}$ will be the true quotient.

Division, among logicians, is the explication of a complex idea, by enumerating the ſimple ideas of which it is compoſed; in which ſenſe it is nearly allied to definition, only that this laſt regards names and things, whereas diviſion is employed wholly about ideas.

When the parts of an idea are divided, in order to a clearer explication of the whole, this is called a ſubdiviſion: thus, a year is divided into twelve months, a month is ſubdivided into weeks, weeks into days, days into hours, and ſo on.

The rules for a good diviſion are theſe, that the members entirely exhauſt the whole; that they be oppoſite; that ſubdiviſions be not too numerous; that the whole be firſt divided into its larger parts, and theſe into the more remote and minute parts.

Division, in muſic, the dividing the interval of an octave into a number of leſs intervals. See Octave.

Division *of a Battalion*, are the ſeveral parcels into which a battalion is divided in marching. The lieutenants and enſigns march before the diviſions.

Division, in the marine, is a certain number of ſhips, in a fleet or ſquadron of men of war, diſtinguiſhed by a particular flag or pendant, and commanded by a particular officer: a ſquadron is always ranged into three diviſions, the commanding officer of which is generally ſtationed in the center.

When a fleet conſiſts of ſixty ſail of the line, (i. e. ſhips of or above 60 guns) the admiral divides it into three ſquadrons, each of which has its diviſions, and three general officers, viz. admiral, vice-admiral, and rear-admiral. Each ſquadron has its proper colours, and each diviſion its proper maſt; for example, the white flag is proper for the firſt ſquadron of France; the white and blue for the ſecond; and the blue for the third. In England, the firſt admiral of the fleet carries the union-flag at the main-top-maſt-head; next the admiral of the white; and then the admiral of the blue. The particular ſhips carry pendants of the ſame colour of their ſquadrons, at the maſts of their reſpective diviſions; ſo that the laſt ſhip in the diviſion of the blue ſquadron, wears a blue pendant at the mizen-top maſt-head.

The general officers, or commanders of diviſions, place themſelves in the center of their diviſions. We muſt except the three commanding admirals, who, in a ſailing poſition, lead their reſpective ſquadrons.

DIVISOR, in arithmetic, the number that divides another, called the dividend; or which ſhews into how many parts the dividend is to be divided. See the article Division.

DIVORCE, a breach or diſſolution of the bond of marriage. See Marriage.

DIURESIS, in medecine, an excretion of urine: whence,

DIURETICS, in pharmacy, ſuch ſimples as increaſe the diſcharge of urine; or which are ſuppoſed to have a power of removing obſtructions in the urinary paſſages. Diuretics muſt increaſe the liquor to be ſecreted in the proper glandules, and are of the five following kinds: the firſt contains all relaxing and emollient decoctions, emulſions, &c. which do not ſtimulate, but only remove obſtructions, by relaxing the veſſels. The ſecond comprehends all thoſe which diſſolve and dilute the blood. The third contains three kinds of medicines: 1. All acids which ſtimulate the veſſels. 2. All ſaline bodies. 3. All fixed and volatile ſalts. The fourth takes in all that preſerve a moderate heat of the body, without ſweat. The fifth claſs contains thoſe whoſe effects diſcover themſelves about the kidneys and bladder; alſo all acrid and ſolvent diuretics.

DIURNAL, in aſtronomy, ſomething relating to the day, in oppoſition to nocturnal, which regards the night.

Diurnal Arch, the arch or number of degrees that the ſun, moon, or ſtars, deſcribe between their riſing and ſetting.

Diurnal Circle. See Circle.

Diurnal *Motion of a Planet*, is ſo many degrees and minutes as any planet moves in twenty-four hours. Hence the motion of the earth about its axis, is called its diurnal motion. See Earth.

Diurnal is alſo uſed in ſpeaking of what belongs to the nyct-hemeron, or natural day of twenty-four hours, in oppoſition to annual, menſtrual, &c. The diurnal phœnomena of the heavenly bodies, ariſe from the motion of the earth round its axis.

DIZZINESS, in medicine, a diſeaſe of the head, called by phyſicians vertigo. See Vertigo.

DO, in muſic, a note of the Italian ſcale correſponding to ut of the common gamut. See Gamut.

DOCIMASIA, in Greek antiquity, a probation of the magiſtrates and perſons employed in public buſineſs at Athens. It was performed publicly in the forum, where they were obliged to give an account of themſelves and their paſt life before certain judges.

DOCK, *Rumex alias Lapathum*, in botany. See the article Rumex.

Dock, or Docking, in law, an expedient for cutting off an eſtate-tail in lands or tenements, that the owner may be enabled to ſell, give, or bequeath the ſame.

Dock, in the manege, called by the French trouſſequeue, is a large caſe of leather, as long as the dock of a horſe's tail, which covers the tails of leaping horſes.

Dock, in the marine, a ſort of broad deep trench, formed on the ſide of a harbour, or on the banks of a river, and commodiouſly prepared either for building ſhips, or receiving them to be repaired, or cleaned on the bottom.

Theſe ſort of docks have generally ſtrong flood-gates to prevent the flux of the tide from entering the dock while the ſhip is under repair.

There are likewiſe other ſort of docks, called wet docks, where a ſhip can only be cleaned during the time of the ebb-tide, or in the interval between the time which the tide left her dry on the ground, and the time it returns to her. Theſe ſort of docks have no flood-gates.

DOCKET, a little bill tied to wares or goods, directed to the perſon or place they are to be ſent to.

Docket, or Dogget, in law, ſignifies a brief in writing, made on a ſmall piece of paper, or parchment, containing the purport and effect of a large writing.

Docking *a Ship*, receiving her into the dock, cleaning the bottom with burning faggots, and daubing it over with a maſs of tallow, ſulphur, and other ingredients, to make it ſmooth, that it may the more ſwiftly glide through the water.

Dock-Yards, magazines containing all ſorts of naval ſtores; the principal ones in England, are thoſe of Chatham, Portſmouth, Plymouth, Woolwich, Deptford, and Sheerneſs. In time of peace ſhips of war are laid up in theſe places, where ſuch as want repairing are taken into the docks, examined, and refitted for ſervice.

Theſe yards are generally ſupplied from the northern crowns, with hemp, pitch, tar, roſin, and ſeveral other ſpecies: but as for maſts, particularly thoſe of the largeſt ſize, they are generally brought from New England.

How much it imports the good of the public to keep thoſe magazines conſtantly repleniſhed, every one is able to judge: and it were much to be wiſhed the improving the fore-mentioned commodities in our Britiſh plantations might meet with all poſſible encouragement, leſt one time or other it may prove difficult to get them elſewhere. It is reaſonable to think ſuch an undertaking will put the nation to conſiderable charge before it be brought to perfection; but when it can, many are the advantages that will ariſe from it.

DOCTOR, a perſon who has paſſed all the degrees of a faculty, and is impowered to teach or practiſe the ſame: thus we ſay, doctor in divinity, doctor in phyſic, doctor of laws.

Doctor *of the Church*, a title given to certain of the fathers, whoſe doctrines have been moſt generally received: of theſe are uſually reckoned four in the Greek church, viz. St. Athanaſius, St. Baſil, St. Gregory Nazianzen, and St. Chryſoſtom: and three in the Latin church, namely, St. Jerom, St. Auguſtine, and Gregory the Great.

DOCUMENT, in law, ſome written monument produced in proof of any thing aſſerted.

DODARTIA, in botany, a genus of plants, whoſe flower conſiſts of one ringent petal, having its tube cylindraceous and deflexed. The upper lip is erect and indented, the lower ſpreading and trifid, and contains four didynamious ſtamina. The fruit is a globoſe, bilocular capſule, including a great number of very ſmall ſeeds.

DODDER, *Cuſcuta*, in botany. See the article Cuscuta.

DODECAGON, in geometry, a regular polygon, conſiſting of twelve equal ſides and angles.

Dodecagon, in fortification, is a place ſurrounded by twelve baſtions.

DODECAHEDRON is one of the platonic bodies, or five regular ſolids, and is contained under twelve equal and regular pentagons.

The ſolidity of a dodecaheron is found by multiplying the area of one of the pentagonal faces of it by 12; and then this latter product by $\frac{1}{3}$ of the diſtance of the face from the center of the dodecahedron, which is the ſame as the center of the circumſcribing ſphere.

The ſide of a dodecahedron inſcribed in a ſphere, is the greater part of the ſide of a cube inſcribed in that ſphere, cut into extreme and mean proportion.

If the diameter of the ſphere be 1.0000, the ſide of a dodecahedron inſcribed in it will be .35682 nearly.

All dodecahedrons are ſimilar, and are to one another as the cubes of the ſides; and their ſurfaces are alſo ſimilar, and therefore they are as the ſquares of their ſides; whence, as .509282 is to 10.51462, ſo is the ſquare of the ſide of any dodecahedron to the ſuperfices thereof, and as .3637 is to 2.78516, ſo is the cube of the ſide of any dodecahedron to the ſolidity of it.

DODECANDRIA, the name of the eleventh claſs in the Linnæan ſyſtem of botany, and comprehends all thoſe plants with hermaphrodite flowers, which are furniſhed with any number of ſtamina, from twelve to nineteen incluſive. To this claſs belong agrimony, aſarum, heliocarpus, reſeda, &c.

DODECATEMORY, an appellation given to the twelve ſigns of the zodiac, becauſe each of them contains a twelfth part of the whole. See SIGN.

DODECATHEON, in botany, a genus of plants, whoſe flowers grow in a truſs. The corolla of each is monopetalous, with a ſhort tube and reflexed border. The fruit is an ovato-oblong, unilocular capſule, containing a number of ſmall ſeeds.

DODONIAN, *Dodonæus*, in antiquity, an epithet given to Jupiter, becauſe he was worſhipped in a temple built in the foreſt of Dodona, where was the moſt famous, and it is ſaid, the moſt ancient oracle of all Greece.

DODRANS, in antiquity, three-fourths of the as. See the article AS.

DOG, *Canis*, in zoology, a genus of quadrupeds. See the article CANIS.

Bite of a mad DOG, in medicine. See the article HYDROPHOBIA.

DOG, *Canis*, in aſtronomy. See CANIS.

DOG'S BANE, *Apocynum*, in botany. See the article APOCYNUM.

DOG-BERRY-TREE, a name ſometimes uſed for the cornel-tree. See CORNUS.

DOG-DAYS, the ſame with thoſe called canicular. See CANICULAR.

DOG-DRAW, a term in the foreſt-law, uſed when a man is found drawing after a deer, by the ſcent of a hound which he leads in his hand.

DOG'S ROSE, a name ſometimes given to the common briar, or hip-buſh, a ſpecies of wild roſe. See the article ROSE.

DOG'S TONGUE, a plant called by botaniſts cynogloſſum. See the article CYNOGLOSSUM.

DOG'S TOOTH, *Dens Canis*, a plant called by Linnæus, erythronium. See the article ERYTHRONIUM.

DOG'S TOOTH SHELL, the ſame with the dentalium. See DENTALIUM.

DOG-WOOD, the ſame with the dog berry-tree. See CORNUS.

DOG-WOOD of Jamaica, a ſpecies of the robina. See ROBINA.

DOGADO, a dutchy of Italy, of which Venice is capital. See VENICE.

DOGE, the chief magiſtrate in the republic of Venice and Genoa.

This dignity is elective in both places: at Venice it continues for life, at Genoa it is only for two years. His title is ſerenity: he is chief of the council, and mouth of the republic.

DOGGER, in naval affairs, a Dutch fiſhing veſſel of the northern or German ocean: they are moſt commonly uſed in the herring-fiſhery, and are navigated with two maſts, viz. a main-maſt, and a ſmall mizen-maſt.

DOGGERS, in the alum-works, a poor kind of alum-ore. See ALUM.

DOGGS denote iron machines for burning wood on; alſo hooks fixed in large timbers for drawing them with horſes.

DOGMA, a principle, maxim, tenet, or ſettled opinion, particularly with regard to matters of faith and philoſophy.

DOGMATICAL, ſomething belonging to a doctrine or opinion. A dogmatical philoſopher is one who aſſerts things poſitively; in oppoſition to a ſceptic, who doubts of every thing.

DOGMATISTS, *Dogmatici*, a ſect of ancient phyſicians, of which Hippocrates was the firſt author. They are alſo called *logici*, logicians, from their uſing the rules of logic in ſubjects of their profeſſion. They laid down definitions and diviſions, reducing diſeaſes to certain genera, and thoſe genera to ſpecies; and furniſhing remedies for them all; ſuppoſing principles, drawing concluſions, and applying thoſe principles and concluſions to particular diſeaſes under conſideration; in which ſenſe the dogmatiſts ſtand contradiſtinguiſhed from empirics and methodiſts. They reject all medicinal virtues that they think not reducible to manifeſt qualities: but Galen hath long ago obſerved of ſuch men, that they muſt either deny plain matter of fact, or aſſign but very poor reaſons and cauſes of many effects they pretend to explain.

DOLE, in our ancient cuſtoms, ſignified a part, or portion, moſt commonly of a meadow, where ſeveral perſons have ſhares. It alſo ſtill ſignifies a diſtribution or dealing of alms, or a liberal gift made by a great man to the people.

DOLE, in the law of Scotland, is uſed for malevolent intention.

DOLG-BOTE, in our old writers, implies a recompence for a ſcar or wound.

DILICHOS, in botany, a genus of plants bearing papilionaceous flowers; the vexillum is roundiſh, large, emerginated and wholly reflexed; the alæ is ovate, obtuſe, and the length of the carina, and the carina is lunulated and compreſſed.

The fruit is a large acuminated oblong pod, bivalvular and bilocular, containing a number of elliptical ſeeds, ſometimes compreſſed.

DOLIUM, in natural hiſtory, the name of a ſimple ſhell, without any hinge, formed of one continuous piece, which makes a body of a figure approaching to round, diſtended, and, as it were, inflated.

Some of theſe have the mouth dentated; others ſmooth; in ſome the clavicle is moderately long, though in moſt it is depreſſed; and the columella is in ſome ſpecies ſmooth, in others wrinkled: theſe ſhells are found on the ſhores of many parts of the Eaſt-Indies, and are alſo frequently brought from America.

DOLLAR, a ſilver coin current in Spain, ſeveral parts of Germany, and Holland. There are various ſpecies of dollars, as the rix-dollar, the ſemi-dollar, the quarter-dollar, &c. for each of which ſee the article Exchange.

DOLPHIN, in ichthyology, the Engliſh name of the delphinus, with an oblong rounded body, and a long acute roſtrum. It is conſiderably longer than the porpus: the opening of the mouth is vaſtly wide, reaching on each ſide to the breaſt; and the fiſtula, or aperture for diſcharging the water, is in the middle of its head.

Dolphin, *Delphinus*, in aſtronomy. See Delphinus.

Dolphins *of the Maſt*, in naval affairs, a ſort of flat wreath of platted cordage, to be faſtened occaſionally round the maſt as a ſupport to the puddening: the uſe of it is to prevent the yards of the main or fore-ſail from ſliding down on the maſt, when the ropes which held them up may have been ſhot away during the time of an engagement. See the article Puddening.

DOME, in architecture, a ſpherical roof, or a roof of a ſpherical form, raiſed over the middle of a building, as a church, hall, pavilion, veſtibule, ſtair-caſe, &c. by way of crowning.

Domes have commonly columns ranged around their outſides, both for the ſake of ornament and ſupport to the work.

DOMESDAY, or Dooms-Day-Book, a very ancient record made in the time of William the Conqueror, which now remains in the exchequer, and conſiſts of two volumes, a greater and a leſs; the greater contains a ſurvey of all the lands in moſt of the counties in England, and the leſs comprehends ſome counties that were not then ſurveyed. The book of domeſday was begun by five juſtices, aſſigned for that purpoſe in each county, in the year 1081, and finiſhed in 1086. It was of that authority, that the Conqueror himſelf ſubmitted, in ſome caſes wherein he was concerned, to be determined by it. Camden calls this book the tax-book of king William; and it was farther called Magna Rolla.

There is likewiſe a third book of domeſday, made by command of the Conqueror; and alſo a fourth, being an abridgment of the other books.

Domes-Men, judges or perſons appointed to determine ſuits and controverſies between parties. See Day's Man.

DOMESTIC, any man who acts under another, ſerving to compoſe his family, in which he lives, or is ſuppoſed to live, as a chaplain, ſecretary, &c. Sometimes domeſtic is applied to the wife and children, but very ſeldom to ſervants, ſuch as footmen, porters, &c.

Domestic Navigation, coaſting, or ſailing along the ſhore, in which the lead and compaſs are the chief inſtruments.

DOMINATION, in theology, the fourth order of angels, or bleſſed ſpirits, in the hierarchy, reckoning from the ſeraphin.

DOMINI, or Anno Domini. See the article Anno.

DOMINICAL Letter, in chronology, properly called Sunday-Letter, one of the ſeven letters of the alphabet ABCDEFG, uſed in almanacs, ephemerides, &c. to denote the Sundays throughout the year.

The word is formed from the Latin, *Dominica*, or *Dominicus dies*, Lord's day, Sunday.

The dominical letters were introduced into the calendar by the primitive Chriſtians, in lieu of the nundinal letters in the Roman calendar.

The firſt of theſe letters, which is A, is placed againſt the 1ſt of January; the ſecond, B, againſt the 2d of January; and ſo on to the ſeventh, G, which is placed againſt the 7th of January; after which the letter A is placed againſt the 8th, &c. to the end of the year. Hence it follows, that whatever letter happens to be placed againſt any day of any week, the ſame letter will point out that day throughout the year. Thus, if the firſt of January, againſt which the letter A is placed, happen to be a Monday, then will G be the Sunday-letter, and all the days in the calendar which have G put to them will be Sundays; and for the ſame reaſon the letter A will point out all the Mondays throughout that year. Now as a common year conſiſts of 365 days, or 52 weeks and one day over, it follows, that as the 1ſt, 8th, 15th, 22d, &c. day of the year have the ſame letter placed againſt it, the year will end on the ſame day of the week it commenced upon: and therefore, if the Sunday-letter in any aſſigned year (Leap-year excepted) be G, for the next it will be F, for the next following E, &c. in a retrograde order, untl the 8th year, (ſuppoſing no Leap-year to intervene) in which the dominical letter will be G again, and will thus proceed in a retrogreſſive manner, the Sunday-letter returning in the 15th, 22d, 29th, &c. years. Hence it is very evident, that whatever letter was the dominical for the year 1, the ſame would have returned in the years 8, 15, 22, 29, &c. until this time (ſetting aſide the interpolation of Leap-years, and the reformation of the calendar.)

Now as any term of the progreſſion 1, 8, 15, 22, &c. after the firſt, leſſened by unity, will exactly divide by 7, it follows, that if the propoſed year be divided by 7, the remainder will ſhew the order of the dominical-letter for that year: thus, in 1737, the dominical letter was the ſame as in the year 1; and in 1740 it was three letters diſtant from it in a regreſſive order, that is, if the dominical letter for the year 1, was B, in the year 1737 it was B alſo, but in 1740 it was F.

But becauſe every fourth year conſiſts of 366 days; hence the above ſeries will be interrupted, and the order will not return till after twenty-eight years: for ſuppoſe G the Sunday-letter for the firſt after Leap-year, then the order of the letters for twenty-eight years next following will ſtand thus; G, F, E, $\overline{\mathrm{D\,C}}$, B, A, G, $\overline{\mathrm{F\,E}}$, D, C, B, $\overline{\mathrm{A\,G}}$, F, E, D, $\overline{\mathrm{C\,B}}$, A, G, F, $\overline{\mathrm{E\,D}}$, C, B, A, $\overline{\mathrm{G\,F}}$, E, D, C, $\overline{\mathrm{B\,A}}$. Now as theſe letters proceed in the regular order, A, B, C, D, E, F, G, A, B, &c. it follows, that if the number of any propoſed year be increaſed by that of the Leap-years contained therein, the order of the letters according to the firſt ſeries will again be reſtored; therefore, let any propoſed year of our Lord be increaſed by its fourth part, (omitting fractions) and then the 1, 8, 15, 22d, &c. years will, as before, have the ſame dominical letter, and for the intermediate years, the remainder, after dividing by 7, will ſhew the order of the dominical letter according to that with which the computation firſt began.

In the Julian account the dominical letter correſponding to the reſpective years 1, 8, 15, &c. was aſſigned to the letter B; therefore, to find the Sunday letter for any given year agreeable to that method of computation, we muſt, after having encreaſed the number of the year by its fourth part, add 4 to the ſum before we divide by 7; becauſe, as there muſt remain 1, after having divided by 7, in order to have the ſame dominical letter as in the years 1, 8, 15, &c. and B being in the fifth place from G, (the radical Julian letter) reckoning towards A, it muſt certainly follow, that the dominical letter will, by theſe means, be removed four places farther from where it would otherwiſe have been.

Hence this rule for finding the Julian dominical letter:

Add to the year its fourth part and 4, and divide that ſum by 7; if nothing remains, the dominical letter is G; but if there be any remainder, ſubtract it from 7, it leaves the index of the dominical letter required: reckoning for 1, A; for 2, B, for 3, C, &c.

Thus, if it were required to find the dominical letter for the year 1765, it will be B.

For the given year is	1765
To which add its fourth part	441
And ——— ———	4
The ſum is ——— ———	2210

Which being divided by 7, the remainder will be 5, which taken from 7 leaves 2, the index of the letter B.

But by the reformation of the calendar under pope Gregory, the order of the dominical letters was interrupted in the Gregorian year: for the year 1582, which at the beginning had G for its dominical letter, by retrenching ten days after the fourth of October, came to have C for its dominical letter; and by having but one dominical letter for the year 1700, therefore the dominical letter of the ancient Julian calendar is four places before that of the Gregorian. —Whence, to find the dominical letter according to the Gregorian year, we muſt divide the ſum of the number of the year and its fourth part by 7, and ſubtract the remainder from 7, which will give the index of the dominical letter as before.

But becauſe the years 1800, 1900, 2100, 2200, &c. according to the Gregorian calendar, are of 365 days, and conſequently have each but one dominical letter, which according to the Julian would have two; therefore the courſe of the dominical letters will be changed, and conſequently this method of finding the dominical letter will only hold good until the end of the year 1799.

To find the dominical or Sunday letter, according to the calendar, until the year 1799 incluſive, add to the year of our Lord its fourth part, omitting fractions, and alſo the number 1; divide the ſum by 7; and if there is no remainder, then A is the Sunday letter: but if any number remains, then the letter ſtanding againſt that number in the ſmall annexed table, is the Sunday letter.

0	A
1	G
2	F
3	E
5	D
4	C
6	B

For the next century, that is, from the year 1800, till the year 1899 incluſive, add to the current year only its fourth part, and then divide by 7, and proceed as in the laſt rule.

Note, That in all Biſſextile, or Leap-years, the letter found as above will be the Sunday-letter from the intercalated day excluſive, to the end of the year.

DOMINICANS, an order of religious, called in France Jacobins, and in England Black Fryars, or Preaching Fryars. This order, founded by St.

Dominic, a native of Spain, was approved of by Innocent III. in 1215, and confirmed by a bull of Honorius III. in 1216.

DOMINION, *Dominium*, in the civil law, ſignifies the power to uſe or diſpoſe of a thing as we pleaſe.

DOMINUS, in the civil law, he who poſſeſſes any thing by right of purchaſe, gift, loan, legacy, inheritance, payment, contract, or ſentence.

Dominus, in the feudal law, he who grants a part of his eſtate in fee to be enjoyed by another.

DONATION, an act whereby a perſon transfers to another, either the property or the uſe of ſomething, as a free gift. In order to be valid, it ſuppoſes a capacity both in the donor and donee; and requires conſent, acceptance, and delivery; and by the French law, alſo regiſtry. Civilians diſtinguiſh donation into pure and conditional. *Donatio pura* is when one gives a thing with an intention that it become immediately the property of the donee, never to revert to the donor; and this from no other motive than his generoſity. *Donatio conditionalis* is when one gives a thing with an intention that it become the property of the donee, upon performing ſome condition ſtipulated.

DONATISTS, Chriſtian ſchiſmatics in Africa, who took their name from their leader Donatus.

DONATIVE, a gratuity, or preſent, made to any perſon.

DOOR, in architecture, an aperture in a wall to give entrance and exit into and out of a building, or any apartment thereof.

It is laid down as a rule, that the doors of an houſe be as few in number, and as moderate in dimenſions, as poſſible; as all openings are weakenings.

Secondly, That they do not approach too near the angles of the walls, it being a very great ſolecism to weaken that part which ſtrengthens all the reſt.

Thirdly, That the doors, if poſſible, be placed over one another, that void may be over void, and full over full, which circumſtance will greatly ſtrengthen the whole fabric.

Fourthly, That if poſſible they may be oppoſite to each other, in ſuch a manner, that one may ſee from one end of the houſe to the other, which will not only be very graceful, but moſt convenient, in reſpect that it affords means of cooling the houſe in ſummer, by letting the air through it, and by keeping out the wind in winter, which way ſoever it ſit.

Fifthly, It is not only ornamental, but very ſecure, to turn arches over doors, which will diſcharge them in a great meaſure from the ſuperincumbent weight.

The proportions of doors are adjuſted by thoſe of a man. In large buildings, they muſt be always larger than in ſmaller; but ſhould not be leſs than ſix feet high in any to admit a man of a juſt ſtature erect: and as the breadth of a man, with his arms placed akembo, is nearly ſubduple his height, the width ought never to be leſs than three feet. Some architects give us theſe dimenſions following; in ſmall buildings, the breadth of the door four feet, or four and a half; in the middling buildings five, or ſix; in large ones ſeven, or eight: in chambers of the firſt ſtory three and a half, three and three fourths, or four; of the ſecond, four, or four and a half; of the third, five, or ſix; in churches ſeven or eight; in gates, nine, ten, or twelve: hence their height is eaſily determined, except for the gates of cities, which ſhould only be four-fifths of their breadth.

DORADO, in ichthyology, the ſame with guaracapema. See Guaracapema.

DOREE, or John Doree, a fiſh, called by authors faber. See the article Faber.

DORIC, in general, any thing belonging to the Dorians, an ancient people of Greece, inhabiting near Mount Parnaſſus.

Doric Order, in architecture, the ſecond of the five orders, being that between the Tuſcan and Ionic.

This order ſeems the moſt natural and beſt proportioned of all the orders, the ſeveral parts of it being founded on the natural poſition of ſolid bodies. Accordingly, the Doric is the firſt, and moſt ancient of the orders of architecture, and is that which gave the firſt idea or notion of regular building.

It was indeed more ſimple at its firſt invention, than it is at preſent; and when they came in after times to adorn and enrich it more, the appellation of Doric was reſtrained to this richer manner, and then they called the primitive, ſimple manner by the new name of Tuſcan.

Some time after its invention it was reduced to the proportions, ſtrength, and beauty of the body of a man: hence, as the foot of a man was judged the ſixth part of his height, they made the Doric column ſix diameters high. After that, they added another diameter to it, and made it ſeven, which augmentation ſeemed to bring it nearer to the proportion of a man, the human foot, at leaſt in our days, not being a ſixth, but nearly a ſeventh part of the body.

The characters of the Doric order, as they are now managed, are, the height of its column, which is eight diameters; the frieze, which is adorned with triglyphs, drops, and metopes; its capital, which is without volutes, and its admitting of cymatiums.

It has been already obſerved, that the ancients had two Dorics; the firſt of which was the more ſimple and maſſive, and was chiefly uſed in temples; the ſecond, which was the more light and delicate, they uſed in porticos and theatres.

The Doric is uſed by the moderns, on account of its ſolidity, in large, ſtrong buildings, as in the gates of cities and citadels, the outſides of churches, and other maſſy works, in which delicacy of ornaments would not be ſuitable.

The moſt conſiderable ancient monument of this order is the theatre of Marcellus at Rome, the capital, the height of the frieze, and projecture of which are much ſmaller than in the modern architecture.

Vignola adjuſts the proportion of the Doric order as follows: he divides the whole height of the order without the pedeſtal into twenty parts, or modules, one of which he allows to the baſe; fourteen to the ſhaft, or fuſt; one to the capital; and four to the entablature: the ſeveral parts and members may be ſeen under their reſpective articles, Column, Corniche, Base, Frieze, &c.

Doric Dialect, in grammar, one of the five dialects, or manners of ſpeaking, which were principally in uſe among the Greeks.

It was firſt uſed by the Lacedemonians, particularly thoſe of Argos; afterwards it paſſed into Epirus, Lybia, Sicily, and the iſlands of Rhodes, Crete, &c.

Doric Mode, in muſic, the firſt of the authentic modes of the ancients; its character is to be ſevere, tempered with gravity and joy; and is proper upon religious occaſions, as alſo to be uſed in war.

It begins D, *la*, *ſol*, *re*. Plato admires the muſic of the Doric mode, and judges it proper to preſerve good manners, as being maſculine; and on this account allows it in his commwealth.

Doring, or Daring, among ſportſmen, a term uſed to expreſs a method of taking larks by means of a clap-net and looking-glaſs.

DORMANT, in heraldry, is uſed for the poſture of a lion, or any other beaſt, lying along in a ſleeping attitude, with the head on the fore-paws; by which it is diſtinguiſhed from the couchant, where though the beaſt be lying, yet he holds up his head.

Dormant Tree, in architecture, ſignifies a window made in the roof of an houſe, or above the entablature, being raiſed upon the rafters.

DORMITORY, a gallery in convents or religious houſes, divided into ſeveral cells, in which the religious ſleep or lodge.

DORONICUM, leopard's bane, in botany, a genus of plants, producing compound, radiated flowers. The diſcous florets are hermaphrodite and funnel-ſhaped, and the rays are compoſed of ſeveral ligulated, ſpear-pointed female florets. Theſe are ſucceeded, each by a ſingle furrowed ſeed, covered with down, and contained in the calyx, which is ſlightly connivent.

The doronicum officinarum grows naturally in Hungary and Switzerland, the roots of which are ſaid to be an alexipharmic, and good againſt the bites of venemous creatures; but modern practice gives it little credit in any ſuch intentions, and is therefore much in diſuſe.

DORSAL, an appellation given to whatever belongs to the back. See Dorsum.

Dorsal Muscles are the muſcles of the back and loins, which are for the moſt part common: there are of the extenſors uſually reckoned three on each ſide, viz. the ſacrolumbaris, the longiſſimus dorſi, and the ſemiſpinoſus: the flexors are three alſo, viz. the quadratus lumborum, the pſoas parvus, and the intertranſverſales lumborum. See each under its proper head.

Dorsal Nerves. See Nerve.

DORSIFEROUS Plants, among botaniſts, ſuch as are of the capillary kind, without ſtalks, and which bear their ſeeds on the backſide of their leaves.

The word is formed from the Latin, *dorſum*, the back, and *fero*, to bear.

DORSTENIA, Contrayerva, in botany, a genus of plants, which are deſtitute of a corolla; but the cup, which is a common involucrum, contains ſeveral quadrangular perianthiums, with four filiform ſtamina each.

The ſeeds, which are roundiſh and ſolitary, are contained in a common fleſhy receptacle. See the article Contrayerva.

DORSUM, Back, in anatomy, comprehends all the poſterior part of the trunk of the body, from the neck to the buttocks. The back is furniſhed with ſeveral muſcles, which are common to it with the loins, as the longiſſimus dorſi, the ſacro-lumbaris, and ſemiſpinoſus; theſe are called extenſors. See Extensor.

To the back likewiſe belong the intertranſverſales lumborum, the quadratus lumborum, and the pſoas. See the article Intertransversales, &c.

Its bones are the ſpina dorſi, ribs, and os ſacrum. See Spine, Rib, &c.

Dorſum is alſo uſed to denote the upper-ſide of the hand and foot, in contradiſtinction to the lower-ſide, called the palm and ſole. See Hand and Foot.

Dorsum Nasi, the ridge of the noſe. See Nose.

DOSE, in medicine and pharmacy, the quantity of a medicine given at one time; or the proportion which the ſeveral ingredients of a compound medicine bear to each other.

DOSITHEANS, *Doſithei*, in church-hiſtory, a ſect among the Hebrews, being one of the branches of the Samaritans. See the article Samaritans.

DOSSER, in military matters, a ſort of baſket, carried on the ſhoulders of men, uſed in carrying the overplus earth from one part of a fortification to another, where it is wanted.

DOSSIL, in ſurgery, lint made into a cylindric form, or reſembling the ſhape of dates, or olive-ſtones, the ſize of which is very different. Doſſils are uſed in dreſſing a diſordered part, and are ſometimes ſecured by a thread, tied round their middle.

Double Cast, in huſbandry, a term uſed by the farmers for that method of ſowing that does not diſpenſe the neceſſary quantity of ſeed for a piece of land at one bout, but requires going over many places twice.

Doule Descant, in muſic. See the article Descant.

Double *Horizontal Dial*, one with a double gnomon, one of which points out the hour on the outward circle, and the other ſhews the hour upon the ſtereographic projection drawn upon it. This dial not only finds the meridian, hour, &c. but ſhews the ſun's place, riſing and ſetting, declination, amplitude, altitude, and azimuth, with many other uſeful propoſitions.

Double Fichy, or Fiche, in heraldry, the denomination of a croſs, when the extremity has two points, in contradiſtinction to fiché, where the extremity is ſharpened away to one point.

Double Letter, in grammar, a letter which has the force and effect of two. The Greeks have three of theſe, viz. Z, Ξ, Ψ; the Latins have two, X and Z; and moſt of the modern languages have the ſame.

Double Pedestal. See Pedestal.

Double Plea, in law, is where the defendant in a ſuit alledges two ſeveral matters in bar of the plaintiff's action, when one of them is ſufficient. This is not admitted in common law. Thus when a perſon pleads ſeveral things, the one having no dependance upon the other, ſuch plea is accounted double, and will not be admitted; but where the things pleaded mutually depend on each other, and the party cannot have the laſt plea without the firſt, there the whole ſhall be received.

Double Plough. See Plough.

Double Point, in the higher geometry. See Curves *of the ſecond Order*.

Double Position. See Position.

Double Quarrel, a complaint made by any clerk, or other, to the archbiſhop of a province, againſt an inferior ordinary for delaying juſtice in ſome ſpiritual cauſe, as to give ſentence, inſtitute a clerk, or the like.

Double Vessel, in chemiſtry, is when the neck of one bolt-head or mattraſs is put and well luted into the neck of another, in order to refine and exalt ſpirits as high as can be. It is ſometimes called a pelican, alſo a diota.

DOUBLET, among lapidaries, implies a counterfeit ſtone compoſed of two pieces of cryſtal, and ſometimes glaſs, faſtened together with proper colours between them, ſo as to appear the ſame to the eye, as if the whole ſubſtance of the cryſtal had been tinged with thoſe colours.

DOUBLING, in the military art, is the putting two ranks or files of ſoldiers into one.

Doubling, among hunters, who ſay that a hare doubles, when ſhe keeps in plain fields, and winds about to deceive the hounds.

Doubling, in the manege, a term uſed of a horſe, who is ſaid to double his reins, when he leaps ſeveral times together, to throw his rider: thus we ſay, the ramingue doubles his reins, and makes pontlevis.

Doubling, in navigation, the act of ſailing round a cape, point of land, &c. ſo as that the cape or point of land becomes between the ſhip and her former ſituation, or between any obſerver and the ſhip.

Doubling *upon*, in a ſea-fight, is when part of one fleet, either by having a greater number of ſhips, or by taking the advantage of the wind with a ſuperior ſkill, encloſes part of the enemy's fleet between two fires, ſo that they are attacked on both ſides; a circumſtance which expoſes them to the greateſt danger, and uſually throws them into confuſion. See Engagement and Line.

Doublings, in heraldry, the linings of robes and mantlings in atchievements.

DOUBLON, or Doubloon, a Spaniſh and Portugueſe coin, being the double of a piſtole. See Pistole.

DOUBTING, *Dubitatio*, the act of with-holding our aſſent from any propoſition, on ſuſpicion that we are not thoroughly appriſed of the merits thereof; or from not being able peremptorily to decide between the reaſons for and againſt it.

Doubting, in rhetoric, ſignifies the debate of the mind with itſelf, upon a preſſing difficulty. It is for the moſt part expreſſed by interrogation, though that is not neceſſary.

DOUCINE, in architecture, a moulding concave above and convex below, ſerving commonly as a cymatium to a delicate corniche. It is likewiſe called gula. See Cymatium and Gula.

DOVE, *Columba*, in ornithology. See Pigeon.

Dove-tailing, in carpentry, is the manner of faſtening boards together by letting one piece into another, in the form of the tail of a dove. The dove-tail is the ſtrongeſt of the aſſemblages or jointings, becauſe the tenon or piece of wood which is put into the other, goes widening to the extreme, ſo that it cannot be drawn out again, by reaſon the extreme or tip is bigger than the line.

DOWAGER, *Dotiſſa*, a widow endowed, is a title applied to the widows of princes, dukes, earls, and perſons of high rank only.

DOWER, that portion which the law allows a widow out of the lands of her huſband, after his deceaſe.

DOWLE-Stones, in our old writers, the ſame with land-marks.

DOWRY, *Dos*, is properly the money or fortune which the wife brings her huſband in marriage: it is otherwiſe called *maritagium*, marriage-goods, and differs from dower. See Dower.

Dowry is alſo uſed, in a monaſtic ſenſe, for a ſum of money given along with a maid, upon entering her in ſome religious order.

DOXOLOGY, an hymn uſed in praiſe of the almighty, diſtinguiſhed by the title of greater and leſſer.

The leſſer doxology was anciently only a ſingle ſentence, without reſponſe, running in theſe words, “ Glory be to the Father, and to the Son, and to the Holy Ghoſt, world without end, Amen.” Part of the latter clauſe, “ As it was in the beginning, is now, and ever ſhall be,” was inſerted ſome time after the firſt compoſition. Some read this ancient hymn, “ Glory be to the Father, and to the Son, with the Holy Ghoſt.” Others, “ Glory be to the Father, in or by the Son, and by the Holy Ghoſt.” This difference of expreſſion occaſioned no diſputes in the church, till the riſe of the Arian hereſy; but when the followers of Arius began to make uſe of the latter, as a diſtinguiſhing character of their party, it was entirely laid aſide by the Catholics, and the uſe of it was enough to bring any one under ſuſpicion of heterodoxy. The doxology was uſed at the cloſe of every ſolemn office. The Weſtern church repeated it at the end of every pſalm, and the Eaſtern church at the end of the laſt pſalm. Many of their prayers were alſo concluded with it, particularly the ſolemn thankſgiving, or conſecration prayer at the euchariſt. It was alſo the ordinary concluſion of their ſermons.

The greater doxology, or angelical hymn, was likewiſe of great note in the ancient church. It began with theſe words, which the angels ſung at our Saviour's birth, “ Glory be to God on high, &c.” It was chiefly uſed in the communion ſervice, and in men's private devotions. In the Mozarabic liturgy, it is appointed to be ſung before the leſſons on Chriſtmas-day; and St. Chryſoſtom obſerves, that the Aſcetics met together daily to ſing this hymn. Both the doxologies have a place in the church of England, the former being repeated after every pſalm, and the latter uſed in the communion ſervice.

DRACHM, a Grecian coin, of the value of ſeven-pence three-farthings.

DRACO Volans, in meteorology, a fiery exhalation, frequent in marſhy and cold countries.

It is moſt common in ſummer, and though principally ſeen playing near the banks of rivers, or in boggy places, yet ſometimes mounts up to a conſiderable height in the air, to the no ſmall terror of the amazed beholders; its appearance being that of an oblong, ſometimes roundiſh, fiery body, with a long tail. It is entirely harmleſs, frequently ſticking to the hands and cloaths of people, without injuring them in the leaſt.

DRACO, in aſtronomy, a conſtellation of the northern hemiſphere, containing eighty ſtars, according to the following catalogue.

This was the dragon which Juno appointed to keep the golden apples in the orchard of the Heſperides, now thought to be the Cape de Verd iſlands; and, for his diligence and watchfulneſs, he was afterwards placed in heaven.

Order	Magn.	Name.	Bayer Let.	Right Aſcenſion.	Diſtance from Nor. Pole.	Var. in Right Aſcen.	Var. in Declination.
				° ′ ″	° ′ ″	″	″
1	3		λ	169.13.13	19.21.20	48.8	21. 9
2	6			170.25. 1	19.21. 4	48.7	21. 9
3	6			172.10.23	21.56.40	48.4	21. 0
4	6			184 51. 4	19.28.54	36.3	20. 6
5	3		κ	185.52.38	18.49.48	40.2	20. 6
6	6			186. 7.30	18.39.33	40.2	20. 2
7	6			189.22.41	21.54. 1	40.1	20. 6
8	6			181.23.34	23.15.49	36.5	20. 0
9	6			192.39.13	22. 7. 0	36.5	20. 0
10	5		*i*	206.10.14	24.5. 58	36.0	19. 0
11	2		α	209.26.33	24.31.17	24.5	17. 5
12	3		ι	229.52.18	30.13. 9	19.8	12. 9
13	3		θ	239.22. 5	30.48.56	17.2	10.22
14	3		η	245. 9.18	27.55.45	11.8	8. 4
15	4		A	247. 6.38	20.42.56	8.0	7. 9
16	5			247.43.27	36.36.35	8.0	7. 9
17	5			247.43.29	36.34.59	5 0	7. 8
18	5		*g*	249 47.13	24.57.20	4.0	6. 9
19	5			253.38.50	24.29.56	4.0	5. 9
20	6		*b*	253.40.31	24.35.15	13 0	5. 8
21	4		μ	255.52. 6	35.11.16	18.6	4.91
22	2		ζ	257. 9.30	23.59. 0	19.8	14. 9
23	3		*b*	261 19.34	37.30.52	20.2	3. 0
24	4	1^{ma} ad	ν	261.55.44	34.38. 8	20.1	2. 8
25	4	2^{da} ad	ν	261.57.14	34.38.58	20.4	2. 8
26	6			263. 7.31	28. 0.22	18.0	2. 4
27	5		*f*	263.12.26	21.43.15	12.0	2. 4
28	4		ω	264.35.11	21. 8.40	12.0	1. 9
29	6			265. 4.49	15.38.25	36.0	1. 8
30	6			265.52.47	39.9. 22	24.5	1. 4
31	7	1^{ma} ad	Ψ	266.50. 8	17.43.44	24.6	1. 2
32	3		ξ	267.25.15	33. 4.51	24.1	0. 9
33	2		γ	267.47.13	38.28.20	20.6	0. 8
34	5	2^{da} ad	Ψ	270. 7. 5	17.55.17	24.5	0. 0
35	6			270.16.10	12.56.32	48.8	0. 3
36	6			273.24.33	25.39.38	70.0	1. 0
37	6			274.16.48	21.19 48	12.4	1. 4
38	6			274.40.29	21.23.21	12.6	1. 4
39	5		*b*	274.45.56	31.20.12	24.3	1. 5
40	5			274.59.46	10. 3 35	70 2	1. 5
41	5			275. 7.14	9. 8.57	70.4	1. 5
42	6			276.13.58	24.35. 8	24.4	1. 7

Order.	Magn.	Name.	Bayer Let.	Right Aſcenſion.	Declination South.	Var. in Right Aſcen	Var. in Declination.
				° ′ ″	° ′ ″	″	″
43	5		φ	276.17. 7	18.48.18	24.5	2.1
44	4		χ	276.30.25	17.22.27	36.7	2.1
45	5		d	277.27.54	33. 7.54	24.4	2.6
46	5		c	279.33.16	34.41.59	24.5	3.2
47	4		o	281.56.59	30.54.37	13.4	4.2
48	6			283. 9.34	32.30. 4	13.6	4.5
49	6			283.58.43	34 41. 0	18.0	4.5
50	4			283.29.56	14.50.51	36.0	4.8
51	5			284.45. 9	36.58. 5	24.0	4.9
52	4		υ	284.25. 5	19. 2. 7	12.4	4.9
53	5			286.48.22	33.32.26	24.0	5.8
54	5			287.25.11	32.41.55	13.2	6.0
55	6			287.24.25	24.27.50	12.0	6.0
56	6		c	287.33. 9	13.51.40	28.0	6.0
57	4		δ	288. 7. 5	22.45.47	4.0	6.2
58	4		π	289.54. 6	24.44.47	6.0	6.5
59	6			289.42. 5	13.50.55	24.9	6.7
60	4		τ	290. 6.18	17. 6.17	12.9	6.8
61	4		σ	293.13.44	20.42.47	11.4	7.8
62	6			296.40.47	17.31.23	5.0	8.9
63	5		ε	297.17.50	20.20.37	9.0	9.1
64	5		e	299.47.46	25.50.41	8.0	10.0
65	6			299.59.19	26. 2.40	14.3	10.0
66	6			300.25. 2	28.40.50	1.4	10.1
67	5		ρ	300 25.42	22.50. 0	5.0	10.2
68	6			301.52. 1	23.38.58	5.0	10.3
69	6			301.27.47	14.16.52	4.9	10.4
70	6			302.50.48	35.46.56	7.0	10.9
71	6			303.52.18	28.29.58	12.2	11.2
72	6			304.41.24	28.29.51	12.3	11.4
73	6			308.43.14	15.53. 3	3.1	12.5
74	6			310.59.31	9.46.49	40.0	12.8
75	6			311. 1.31	9 25.40	40.2	13.0
76	5			314.59.14	8.21.31	12.4	14.1
77	5			317.32.39	12.51.34	14.0	14.8
78	5			325. 2.21	18.47.17	14.0	16.4
79	7			327.31.15	17.25.50	15.0	16.9
80	6			331.22.59	19. 4.32	16.4	17.4

DRACOCEPHALUM, dragon's-head, in botany, a genus of plants, whoſe corolla conſiſts of a ſingle ringent petal. The tube is the length of the cup. The upper lip is obtuſe and arched; and the lower divided into three ſegments. The germen is quadripartite, which afterwards becomes four ovato-oblong ſeeds, included in the calyx.

This genus comprehends the moldivica of Tournefort, a ſpecies of which is known in the Engliſh gardens, by the name of balm of Gilead, or Turkey balm.

DRACONTIUM, dragon, in botany, a genus of plants, whoſe flower conſiſts of a cymbiform coriaceous ſpatha, which is large and univalvular, with a pentapetalous concave corolla, containing ſeven linear depreſſed ſtamina.

The fruit is a roundiſh berry, incloſing a number of ſeeds.

DRACUNCULI, in medicine, ſmall long worms, which breed in the muſcular parts of the arms and legs, called Guinea-worms.

This diſtemper is very common in Guinea, and principally among the natives; Kempfer found it ſo alſo at Ormuz, upon the Perſian gulph, and likewiſe in Tartary. Dr. Tawne, in his Treatiſe of the Diſeaſes of the Weſt Indies, informs us, that this diſtemper is not ſo frequent any where as on the Gold Coaſt, at Anamboe, and Cormantyn.

The worm is white, round, and uniform, very much reſembling white round tape or bobbing. It is lodged between the interſtices and membranes of the muſcles, where it inſinuates itſelf, ſometimes exceeding five ells in length. It occaſions no great pain at the beginning; but at ſuch times as it is ready to make its exit, the parts adjoining to the extremity of the worm, where it attempts its excluſion, begin to ſwell, throb, and be inflamed: this generally happens about the ancle, leg, or thigh, and rarely higher.

The countries where this diſtemper is obſerved, are very hot and ſultry, liable to great droughts, and the inhabitants make uſe of ſtagnating and corrupted water, in which it is very probable that the ova of theſe animalcula may be contained; for the white people who drink this water, are obnoxious to the diſeaſe as well as the negroes.

The ſurgeons ſeldom attempt to extract this worm by making an inciſion; but as ſoon as they perceive the tumour riſe to a competent bulk, they endeavour to bring it to a ſuppuration, with all convenient expedition; and then the head of the worm diſcovers itſelf, which they ſecure, by tying it to a bit of ſtick or cotton, that it may not draw itſelf up again: thus they continue to roll it round the ſtick, ſometimes one inch, ſometimes two or more, each day, taking great care not to break the worm, elſe it will be very difficult to recover the end of it again; and an abſceſs will be formed, not only at the ſuppurated part, but likewiſe through the whole winding of the muſcles, where the dead putrifying worm remains, which generally occaſions very obſtinate ulcers. During the extraction of the worm, the patient ſhould be plied with bitter aloetic and other anthelmintic medicines, in order to diſlodge the worm the ſooner from his tenement. When the worm is totally extracted, the remaining ulcer may be treated in the ſame manner as other common ulcers; nor does any farther inconvenience remain in the parts of which it had poſſeſſion. This diſeaſe, ſimply conſidered, very rarely, if ever, proves mortal.

DRACUNCULI is alſo uſed for a diſeaſe in children, ariſing from little worms called by that name. See the article WORM.

DRAGONS, dracunculus, in botany, formerly a diſtinct genus of plants; but now comprehended by Linnæus among the arums; for its generical characters and medicinal virtues, ſee the article Arum.

DRAGANT, the ſame with tragacanth. See the article Tragacanth.

DRAGOMAN, Drogman, or Druggerman, a name given in the Levant to the interpreters kept by the ambaſſadors of Chriſtian nations reſiding at the Porte, to aſſiſt them in treating of their maſters affairs.

Dragon, *Draco*, in zoology, an animal called alſo the flying lizard, being furniſhed with two lateral, membranaceous, and radiated wings: it is a true lizard, with a naked and four-legged body, and a long tail: though there are not wanting ſome who deny the exiſtence of any ſuch animal.

Dragon's Belly, in aſtronomy. See the article Venter Dragonis.

Dragon's Blood, *Sanguis Draconis*, in natural hiſtory, a moderately heavy reſin, of a red colour, brought from the Eaſt-Indies. There are two ſorts of it; one in ſmall oval drops or tears, of a fine deep red, which is heightened into a crimſon on grinding them into powder; the other is in larger maſſes, apparently compoſed of tears: of theſe, ſome are of a pale dull red, others of a deep one, not at all inferior to the drop ſort.

The drops and the lumps are ſuppoſed to be the produce of two different trees. The lump ſort is ſaid to exude from the trunks of certain palms growing in the Madeira and Canary iſlands; the drops to be artificially extracted from the fruit of a tree. According to Kempfer, the fruit is laid upon a kind of hurdle, over a large veſſel half full of water. The whole being lightly covered, the water is made to boil, when the fruit being ſoftened by the ſteam, a red juice, which was not diſcoverable in it before, appears upon the ſurface: this is ſcraped off upon flag leaves, and expoſed to the air to dry. The ſame author informs us, that ſome of the preparers of this commodity boil the fruit in water till all the colouring particles are extracted or melted out; after which, the aqueous fluid is evaporated, till the remainder begins to thicken, when it is further exſiccated upon flag leaves, as before.

This drug has been ſometimes counterfeited with artificial compoſitions, coloured with the true dragon's blood, or Brazil wood: theſe are diſtinguiſhed by their either diſſolving in water like gums, or crackling, and not burning in the fire.

The genuine dragon's blood is not acted upon by water, or at moſt communicates to it only a ſlight yellowiſh tinge: laid on a red-hot iron, it readily melts, catches flame, and emits an acid fume approaching to that of benzoine. It diſſolves, but not perfectly, in rectified ſpirit of wine, and tinges a large quantity of the menſtruum of an elegant blood-red colour: it diſſolves readily in oils, and tinges them of a pretty deep red, but ſomewhat leſs beautiful than the colour of the ſpirituous tincture, and conſiderably leſs ſo than that which anchuſa imparts to oil.

The ſpirituous tincture ſtains cold marble of a bright fleſh colour; to warm marble it gives a deeper red, in proportion to the degree of heat. Mr. du Fay obſerves, that by this one ingredient, with the addition of a little pitch for the darker colours, all the various ſhades of red may be obtained, from the lighteſt to the deepeſt; that it does not ſink near ſo far into cold as into hot marble; and that the not ſinking is rather an advantage than an imperfection, as the colours which ſink muſt alſo ſpread, ſo as to render the drawing of fine deſigns impracticable; that the beſt way of obtaining beautiful reds from dragon's blood is, to put the powdered reſin into ſpirit of wine over the fire, and apply on the marble with a pencil the finer part of the ſolution which riſes up about the ſides of the veſſel, adding freſh ſpirit in proportion to the evaporation, till the dragon's blood yields no more tincture.

This reſin, in ſubſtance, has no ſmell or taſte: when diſſolved, it diſcovers a ſlight degree of pungency. It is uſually looked upon as a gentle incraſſant, deſiccative, and reſtringent; and ſometimes preſcribed in theſe intentions againſt alvine and uterine fluxes, and ulcerations both internal and external.

Dragon-Fly, the Engliſh name of the libella. See the article Libella.

Dragons's-Head and Tail, the two nodes of the moon. See the article Node.

Dragon-Shell, the Engliſh name of a ſpecies of concamerated patella, with its roſtrum very much bent. See the article Patella.

DRAGONNE, in heraldry, a lion dragonnée is where the upper half reſembles a lion, the other half going off like the hinder part of a dragon. The ſame may be ſaid of any other beaſt as well as a lion.

DRAGOON, in war, a kind of ſoldier, who acts on horſeback, but without boots, and fights on foot generally; they are poſted in the front of the camp, and march firſt to the charge. As infantry, they have ſerjeants, and as cavalry, cornets; their arms are a ſword, firelock, and bayonet; and when they march on foot, their officers bear the pike and the ſerjeant the halbert. Menage derives the word from the Latin *draconarius*, uſed by Vegetius to ſignify ſoldiers; but it is more probably derived from the German *tragen* or *draghen*, ſignifying to carry, as being infantry carried on horſeback.

Dragoon, in ornithology, the name of a ſmall kind of carrier-pigeon, called *columba tabellaria minima*, by Moore. It is a baſtard-breed between the two ſpecies of pigeons called the horſeman and the tumbler. They are very good breeders; and as they are lighter than the horſeman, they are ſuppoſed to be more expeditious in flight for a few miles; but the horſeman excels them in greater lengths.

DRAINING *of lands*. See the article FEN.

DRAINS, a name given, in the fen-countries, to certain large cuts or ditches, of twenty, thirty, nay ſometimes forty feet wide, carried through the marſhy ground, to ſome river, or other place, capable of diſcharging the water they carry out of the fen-lands. See the article FEN.

DRAKE, in ornithology, the male of the duck-kind. See DUCK.

DRAM, or DRACHM, in commerce, a ſmall weight. See WEIGHT.

DRAMA, a poem containing ſome certain action, and repreſenting a true picture of human life, for the delight and improvement of mankind.

The principal ſpecies of the drama are two, comedy and tragedy. Some others there are of leſs note, as paſtoral, ſatire, tragi-comedy, opera, &c. See the articles TRAGEDY, COMEDY, &c.

The primary parts of the drama as divided by the ancients, are the potaſis, epitaſis, cataſtaſis, and cataſtrophe. The ſecondary parts are the acts and ſcenes. The acceſſary parts are the prologue, chorus, mimus, and epilogue, which pointed out the uſe of the piece, or conveyed ſome other notice to the audience in the poet's name. See PROTASIS, PROLOGUE, CHORUS, &c.

The drama, ſays Voſſius, owes its riſe to the days of feſtivity; for in ancient times, it was uſual for men, when they gathered in the fruits of the earth, to meet together, that they might ſacrifice to the Deity, and unbend their minds from the fatigues of the harveſt. Hence aroſe two ſorts of poetry, the one grave, in praiſe of the gods; the other jocoſe and full of lampoon, againſt one another. Thus, from the former aroſe tragedy, and from the latter, ſatire, comedy, and mimickry.

The drama, in ſome circumſtances, is ſuperior to epic poetry, particularly in action; for in the drama, the perſons themſelves are introduced, every thing is tranſacted in our ſight, and our eyes and ears at once are gratified. Beſides, the action in the drama is much more compendious than in the epic: it takes up leſs time, and therefore requires more art to conduct it. It excites in the mind more rapid commotions, and conſequently makes the pleaſure and admiration more intenſe. For which reaſons Ariſtotle gives the preference to the drama; not that he reckons it more noble in general than the epic, for that would be contrary to truth and reaſon, but only as far as its ſphere extends.

According to the Abbé du Bos, tragic poets ought to place their ſcenes in times remote from that in which they live; but that comedy, on the contrary, ought to be fixed in the very places and times in which it is repreſented; its deſign being to make us laugh at the expence of ridiculous perſons, in order to purge us of thoſe faults it expoſes. Now we cannot diſtinguiſh nature ſo eaſily, when ſhe appears in ſtrange cuſtoms, manners, and apparel, as when ſhe is clad, as it were, after our own faſhion; whereas we always diſtinguiſh human nature in the heroes of tragedies, whether their ſcenes be at Rome or Sparta, by reaſon only great virtues or great vices are there repreſented.

The dramatic poetry of the Romans was at firſt divided into three ſorts, tragedy, ſatire, and comedy; which were afterwards ſubdivided into ſeveral ſpecies. They had two ſpecies of tragedies, viz. the tragœdiæ palliatæ, in which the perſonages, manners, and dreſs, were entirely Greek; and the tragœdiæ prætextatæ, or pretextæ, wherein the perſonages and manners were Roman. The ſatire was a kind of paſtoral poetry, which ſome authors aſſert to have held a kind of middle rank between tragedy and comedy; which is almoſt all we know of it. Comedy, in like manner as tragedy, was divided firſt into two ſpecies, viz. the Greek, or palliata, and the Roman, or togata, by reaſon of the introducing plain citizens into the latter, whoſe dreſs was called toga. The Roman comedy was again ſubdivided into four ſpecies; the togata, properly ſo called, the tabernaria, the attellana, and the mimus. Pieces of the firſt ſort were very ſerious, and admitted even of perſons of diſtinction, for which reaſon they were ſometimes called prætextatæ. The ſecond were comedies of a leſs ſerious nature, and took their name from taberna; which ſtrictly ſignified a place of rendezvous, proper for aſſembling perſons of different conditions, whoſe characters were played off in thoſe pieces. The attellana was a kind of piece very like the Italian comedies; that is, thoſe whoſe dialogues are not written. The actor, therefore, of the attellanæ performed his part juſt as he pleaſed. The mimus reſembled our farces, and the actors thereof performed always bare-foot: whereas, in tragedy, they wore a ſort of ſhoe, or boot, called cothurnus; and, in other ſpecies of comedy, another kind called ſoccus.

For the laws of the drama, ſee the articles UNITY, ACTION, CHARACTER, FABLE, &c.

DRAMATIC, in poetry, an epithet given to pieces written for the ſtage.

DRANK, in huſbandry, a term uſed to denote wild oats, which never fail to infeſt worn-out lands; ſo that when ploughed lands run to theſe weeds and thiſtles, the farmer knows it is high time to fallow them, or elſe to ſow them with hay-ſeed, and make paſture of them.

Some, indeed, deſtroy the drank, by ſowing the lands with beans, and letting looſe ſheep upon them when young. This muſt be done in dry weather, and the ſheep eat up the drank and other weeds, without touching the beans.

DRAPERY, in ſculpture and painting, implies the repreſentation of the cloathing of human figures, and alſo hangings, tapeſtry, curtains, and moſt other things that are not carnations or landſkapes.

The art of drapery conſiſts, 1. In the order of the folds or plaits, which ought to be ſo managed, that you may eaſily perceive what it is they cover, and diſtinguiſh it from any thing elſe. Again, the folds ought to be large, as breaking and dividing the ſight the leſs; and there ſhould be a contraſt between them, otherwiſe the drapery will be ſtiff. 2. In the quality of the ſtuffs; for ſome make their folds abrupt and harſh, others more ſoft and eaſy: the ſurface of ſome have a luſtre, others are flat and dead; ſome are fine and tranſparent, others firm and ſolid. 3. In the variety of colours, which, when well managed, makes the greateſt beauty of painting; all not being equally amicable and friendly with reſpect to each other, and ſome never to be placed near certain others.

M. De Piles obſerves, that drapery muſt never be made to adhere to the parts of the body; that a great motion and lightneſs of the drapery are only proper in figures in great agitation, or expoſed to the wind; and that the nudities of the figures ſhould always be deſigned, before the painter proceeds to the draperies.

DRASTIC, in phyſic, an epithet beſtowed on ſuch medicines as are of preſent efficacy, and potent in operations; and is commonly applied to emetics and cathartics.

DRAUGHT, or Draft, in architecture, the figure of an intended building, deſcribed on paper, in which is laid down, by ſcale and compaſſes, the ſeveral diviſions and partitions of the apartments, rooms, doors, paſſages, &c. in their due proportion to the whole building.

It is cuſtomary, and alſo exceedingly convenient, for any perſon, before he begins to erect a building, to have deſigns or draughts drawn upon paper or vellum, wherein the ichnography or ground-plot of every floor or ſtory is delineated; as alſo the form or faſhion of each front, with the windows, doors, ornaments, in an orthography, or upright. Sometimes the ſeveral fronts, &c. are taken and repreſented in the ſame draught, to ſhew the effect of the whole building, which is called ſcenography, or perſpective. See the article Scenography.

Draught-Compasses, are ſuch as have moveable points to draw fine draughts in architecture.

Draught, in trade, called alſo Cloff or Clough, is a ſmall allowance on weighable goods, made by the king to the importer, or by the ſeller to the buyer, that the weight may hold out when the goods are weighed again.

The king allows 1 ℔ draught for goods weighing no leſs than 1 C wt. 2 ℔ for goods weighing between 1 and 2 C wt. 3 ℔ for goods weighing between 2 and 3 C wt. 4 ℔ from 3 to 10 C wt. 7 ℔ from 10 to 18 C wt. 9 ℔ from 18 to 30, or upwards.

Draught-Hooks, are large hooks of iron, fixed on the cheeks of a cannon-carriage, two on each ſide, one near the trunnion-hole, and the other at the train, diſtinguiſhed by the name of fore and hind draught-hooks. Large guns have draught-hooks near the middle tranſum, to which are fixed the chains that ſerve to keep the ſhafts of the limbers on a march. The fore and hind hooks are uſed for drawing a gun backwards or forwards by men with ſtrong ropes, called draught-ropes, fixed to theſe hooks.

Draught-Horse, in farming, a ſort of coarſe made horſe, deſtined for the ſervice of the cart or plough. In the choice of theſe horſes, for what is called the ſlow draught, they are to be choſen of an ordinary height; for otherwiſe, when put into the cart, one draws unequally with the other, and the tall ones hang upon rhe low ones. The draught-horſe ſhould be large bodied, and ſtrong loined, and of ſuch a diſpoſition as rather to be too dull than too briſk; and rather to crave the whip than to draw more than is needful. Mares are the fitteſt for this uſe for the farmer, as they will be kept cheap, and not only do the work, but be kept breeding, and give yearly encreaſe of a foal of the ſame kind, and fit to be bred to the ſame purpoſes. They ſhould have a good head, neck, breaſt, and ſhoulders: for the reſt of the ſhape, it is not of much conſequence, only for breeding; the mare ſhould have a large belly; for the more room the foal has in the dam, the more fit he will be for that employ. See the article Foal.

Draw-back, in commerce, certain duties, either of the cuſtoms or of the exciſe, allowed upon the exportation of ſome of our own manufactures; or upon certain foreign merchandiſe, that have paid duty on importation.

Draw-Bridge, a bridge made after the manner of a floor, to draw up, or let down, as occaſion ſerves, before the gate of a town or caſtle.

A draw-bridge may be made after ſeveral different ways, but the moſt common are made with plyers, twice the length of the gate, and a foot in diameter. The inner ſquare is traverſed with a croſs, which ſerves for a counterpoiſe; and the chains which hang from the extremities of the plyers to lift up or let down the bridge, are of iron or braſs.

In navigable rivers it is ſometimes neceſſary to make the middle arch of bridges with two moveable platforms, to be raiſed occaſionally, in order to let the maſts and rigging of veſſels paſs through. This kind of draw-bridge is repreſented in the plate; where A B is the width of the middle arch; A L and B L, the two piers that ſupport the draw-bridge N O, one of the platforms of which is raiſed, and the other let down, having the beam P Q for its plyer. To N O are ſuſpended two moveable braces E H, E H, which, reſting on the ſupport E, preſs againſt the bracket M, and thereby ſtrengthen the draw-bridge. Theſe braces are conducted to the reſt by means of the weight S, pulling the chain SLE.

Draw-Gear, denotes any kind of harneſs for draught horſes.

DRAWER *of a Bill of Exchange*, the perſon who draws the bill upon his correſpondent.

DRAWING, in general, denotes the action of pulling out, or haling along: thus we read of tooth-drawing, wire-drawing, &c. See Tooth and Wire.

Drawing, the art of repreſenting the appearances of objects by imitation, or copying without the aſſiſtance of mathematical rules.

The general precepts for drawing, are as follow: 1. Begin with plain, geometrical figures, as lines, angles, triangles, polygons, arches, circles, ovals, cones, cylinders, and the like, being the foundation of all other proportions. The circle is of uſe in the ſeveral orbicular forms, as the ſun, moon, globes, &c. the oval in giving a juſt proportion to the face and mouth; and the ſquare confines a picture you are to copy, &c. the triangle is of uſe in drawing a ſide or half face; angles and arches in perſpective, and the polygon in ground-plots, fortifications, &c. the cone, in ſpires, ſteeples, tops of towers, &c. the cylinder, in columns, pillars, pilaſters, &c. See the article Perspective.

2. Having brought your hand to be fit and ready in general proportions, accuſtom yourſelf to give every object its due ſhade, according to its concavity or convexity, and to elevate or depreſs the ſame, as the object appears either nearer or farther off the light. See the articles Proportion, Design, and Shade.

3. The ſecond practice of drawing conſiſts in forming fruits, as apples, pears, cherries, &c. with their leaves; the imitation of flowers, as roſes, tulips, carnations, &c. herbs, trees, &c. of different kinds.

4. The third, in the imitation of beaſts, fowls, fiſhes, &c.

5. The fourth practice of drawing conſiſts in the imitation of the body of men, with all its lineaments, as head, noſe, eyes, ears, cheeks, arms, and ſhadows, all exactly proportioned, both to the whole, and to one another.

6. The fifth is in the drapery, in the imitation of cloathing, and artificially ſetting off the outward coverings, habit, and ornaments of the body, either of cloth, ſtuff, ſilk, or linen, in their natural and proper folds. See Drapery.

7. In drawing of all the forms before-mentioned, it is requiſite to be firſt perfect in the laying down the exact proportion; ſecondly, in the general or outward lines, before you proceed to ſhadowing, or trimming the work within.

8. In mixed and uncertain forms, where the circle, ſquare, &c. will be of no uſe, but only in the idea thereof in your own fancy, as horſes, oxen, and the like, you muſt do it by judgment, and ſo gain the true proportions by aſſiduous practice: thus, having the ſhape of the thing in your mind, firſt draw it rudely with a coal; then, with more exactneſs, with a lead or pencil; then peruſe it well, and mend it in thoſe parts you have erred in, according to the idea you carry in your mind. When it is mended by your own judgment, compare it with ſome good pattern of the ſame kind, and amend it by that.

9. Having good copies to draw after, learn to reduce them to other proportions, either larger or ſmaller, and this by frequent practice.

10. Let a perfection in drawing be attained by diligent exerciſe, and the inſtruction of a good maſter, before there be any attempts as to colouring and painting; for the former being attained, the reſt will be eaſily underſtood, and gained by frequent practice.

Drawing-Medicines, thoſe more uſually called epiſpaſtics and ripeners.

Drawing, among ſportſmen, the beating the buſhes after a fox.

Fine Drawing, among taylors, the art of ſewing up button-holes, or any rents in cloth, in ſo nice a manner, as that they cannot be diſcovered from the entire part of the cloth.

DRAY, a kind of cart uſed by brewers for carrying barrels of beer or ale; alſo a ſledge drawn without wheels.

Dray, among ſportſmen, denotes ſquirrel-neſts built in the tops of trees.

DREIN, or Drain, in military affairs, a ſmall foſſe or trench, formed to draw the water from the ditch which ſurrounds the place beſieged: the ditch is afterwards filled with faſcines, gabions, hurdles, &c. to facilitate the paſſage of the troops acroſs it. See Ditch.

DRENCH, among farriers, a phyſical potion for horſes. The ingredients for this purpoſe are to be beat coarſely, and either mingled with a decoction, or with wine. Then infuſe it all about a quarter of an hour, and give it to the horſe with a horn, after he has been tied up two hours to the rack.

DRESSING *of Hemp or Flax.* See Hemp and Flax.

Dressing *of Ores*, the preparing them, as they come rough from the mine, for the working by fire. This is done ſeveral ways in different countries, and in reſpect to the different ores of different metals. In Devonſhire they have a very eaſy method, which is ſo expeditious, and ſo good for all the purpoſes, that it is worthy copying in other places. After the ore is dug, it is toſſed up by hand from ſhamble to ſhamble by the ſhovel men in the mine, and drawn up in buckets by a winch at the top of a ſhaft. As ſoon as the whole quantity for one dreſſing is brought up, the large ſtones are broken, and the whole is then carried to the mills, where one horſe turns a wheel that moves the machines for powdering a great quantity of it; theſe are called the ſtamping or knocking mills. The ore is unloaded at the head of the paſs or entrance into theſe mills; this paſs is made of two or three bottom boards, and two ſide boards, in form of a hollow trough, and ſtands in a ſlanting direction. The ore by its own weight is carried down this trough, and lodges itſelf in the coffer. The coffer is a long ſquare box made of the firmeſt timber, and of three feet long, and a foot and a half broad: the ore is not ſuffered to fall into this all at once, but is ſtopped over the mouth of the trough by a croſs board, where a cock turns into it a quantity of water at the ſame time, which waſhes down juſt as much of the ore with it into the trough as there ought to be. In this coffer there are three lifters placed between two ſtrong board leaves, having two braces or thwart pieces on each ſide to keep them ſteady, and a frame with ſtamp heads. Theſe heads are of iron, and weigh about thirty or forty pounds a-piece, and ſerve to break the lumps of ore in the coffer.

The lifters are about eight feet long, and half a foot ſquare. They are always made of heart of oak, and have as many timbers or guiders between them; they are lifted up in order, by a double number of toppits, which are faſtened to as many arms paſſing diametrically through the greateſt beam, which is either turned by the wheel and horſe, or where there is conveniency of water, by an over-ſhot water-wheel on two boulters. The toppits exactly, but eaſily, meet with the tongues, which are ſo placed in the lifters, as that they eaſily ſlide from each other, and ſuffer the lifters to fall with great force on the ore in the trough. The frequent pounding of theſe ſoon reduces the large maſſes into a ſort of ſand, which is waſhed out of the trough by the continual current of the water from the cock through a braſs grate, placed at one end of the coffer between two iron bars.

The powdered ore is conveyed out of the trough into the launder, which is a trench cut in the floor of eight feet long, and ten feet over; this is ſtopped at the lower end with turf, ſo that the water is all ſuffered to paſs away, and the powder of the ore is ſtopped. Thus the launder by degrees fills up with the dreſſed ore; and this is removed out with ſhovels, as occaſion requires. The launder is divided into three parts, the forehead, the middle, and the tail; that ore which lies in the forehead, that is, within a foot and a half of the grate, is always the richeſt and beſt, and is laid up in a heap by itſelf; the middle and tail afford a poorer ore; and theſe are ſometimes laid up in ſeparate heaps; ſometimes thrown into one heap together.

Dressing, in ſurgery, the treatment of a wound or any diſordered part. The apparatus of dreſſing conſiſts of doſſils, tents, plaſters, compreſſes, bandages, bands, ligatures, and ſtrings.

DRIFT *of the Foreſt* is an exact view and examination taken at certain times to know what beaſts are there, in order that none may come on the foreſt but ſuch as have right; and that the foreſt be not overcharged with beaſts.

Drift, in mining, a paſſage cut out under the earth, betwixt ſhaft and ſhaft, or turn and turn; or a paſſage or way, wrought under the earth, to the end of a meer of ground, or part of a meer.

Drift, in navigation, the line upon which a ſhip drives in a ſtorm with her ſide to the wind, when it blows ſo violent as to prevent her from being able to carry any ſail, or only enough to keep her ſufficiently inclined to one ſide, that ſhe may not carry away her maſts by violent rocking: or, drift is the angle which the line of her motion makes with the keel in ſuch a ſituation when her prow is in the middle between the points of the compaſs, to which ſhe comes up and falls. See the article Trying.

DRILL, in mechanics, a ſmall inſtrument for making ſuch holes as punches will not conveniently ſerve for.

Drills are of various ſizes, and are chiefly uſed by ſmiths and turners.

Drill, or Drill-Box, a name given to an inſtrument for ſowing land in the new method of horſe-hoeing huſbandry. It plants the corn in rows, makes the channels, ſows the ſeeds in them, and covers them with earth when ſown; and all this at the ſame time, and with great expedition. The principal parts are the ſeed-box, the hopper, the plough and its harrow, of all which the ſeed-box is the chief. It meaſures, or rather numbers, out the ſeed, which it receives from the hopper, and is for this purpoſe an artificial hand; but it delivers out the ſeed much more equally than can be done by a natural hand. See the article Plough.

DRINK, a part of our ordinary food in a liquid form, ſerving to dilute and moiſten the dry meat.

DRIPS, in architecture. See the article Larmier.

DRIVER, in naval affairs, an oblong ſail hoiſted occaſionally to the mizen-peek when the wind is very fair; the lower corners of it are extended by a boom or pole, which is thruſt out a-croſs the ſhip over the quarter. See Mizen and Quarter.

DRIVERS, among ſportſmen, a machine for driving pheaſant-powts, conſiſting of good ſtrong ozier-wands, ſuch as the baſket-makers uſe; theſe are to be ſet in an handle, and twiſted or bound with ſmall oziers in two or three places.

With this inſtrument the ſportſman drives whole eyes of young powts into his nets.

DRIVING, among ſportſmen, a method of taking pheaſant-powts. It is thus performed: the ſportſman finds out the haunts of theſe birds; and having fixed his nets there, he calls them together by a pheaſant-call, imitating the voice of the dam: after this he makes a noiſe with his driver, which will make them run a little way forward in a cluſter; and this he is to repeat till he has made ſure of them, which an expert ſporſman never fails to do, by driving them into his nets.

Driving, in metallurgy, is ſaid of ſilver, when in the operation of refining, the lead being burnt away, the remaining copper riſes upon its ſurface in red fiery bubbles. See the article Silver.

DROCK, in huſbandry, the upright piece of timber on the right ſide of a plough's tail, to which is fixed the earth-board. See Plough.

DROMEDARY, *Dromedarius*, a large animal of the camel-kind, with only one bunch on its back: it is taller than the horſe, and has a much longer and ſlender neck: its ears are ſhort, and the upper lip is divided in the manner of that of the hare. It is a native of Aſia, and more uſed for riding on, than for carrying heavy loads.

DROMEUS, a name given by the ancients to two very diſtinct animals, the ſtag and dromedary.

DRONE, in the hiſtory of inſects, a kind of male bee, larger than the common working or honey-bees: it is ſo called from its idleneſs, as never going abroad to collect either honey or wax. See Bee.

Drone-Fly, a two winged inſect, extremely like the common drone-bee, whence alſo the name.

DROPS, in architecture, an ornament in the Doric entablature, repreſenting drops, or little bells, immediately under the triglyphs.

DROPSY, in medicine, a preternatural collection of extravaſated aqueous ſerum, which greatly diſtends the veſſels in any part of the body.

This diſeaſe may therefore happen in whatever part the veſſels deſtined for the conveyance of the ſerum are found; that is, either in the whole habit of the body, or in any particular part thereof.

Thus a dropſy may ariſe from a ſordid collection of water, either between the external integuments of the head; between theſe and the cranium; between the cranium and the membranes of the brain; between theſe membranes and the duplicatures; between theſe duplicatures and the brain; between the foldings of the brain; and, laſtly, in its cavities, but yet without producing immediate death.

In the cure of a dropſy the following intentions are to be purſued.

Firſt, to produce a due fluidity and motion to the lymph, whether it is water or ſerum, of the bilious, ichorous, or bloody kind.

Secondly, to evacuate the waters already diſcharged into the cavities of the body.

Thirdly, to remove the weakneſs of the viſcera, whether this weakneſs is the cauſe or the effect of the dropſy.

The fluidity of the lymph is procured, by removing thoſe cauſes which prevent ſuch a fluidity; which are, firſt, the too languid force of the vital powers ſubſervient to circulation; ſecondly, the compreſſion, rupture, or obſtruction of the veſſels; and, thirdly, the exceſſive or preternatural viſcidity of the fluids.

With reſpect to the too languid force of the vital powers ſubſervient to circulation, this is moſt commodiouſly removed by cardiacs, corroboratives, and medicines of a ſtimulating quality, which, if the patient is not afflicted with a violent thirſt, are to conſiſt of aromatic, ſaline, oleous, and hot ſubſtances; which may be eaſily prepared in the various forms of electuaries, mixtures, medicated wines, medicated ales, pills, decoctions, ſyrups, &c.

DROP-WORT. See Filipendula.

Water.Drop-Wort, in botany. See the article Oenanthe.

DROSERA, ſun-dew, in botany, a genus of plants, whoſe flower conſiſts of a monophyllous perſiſtent calyx, cut in five ſharp-points. The corolla is funnel-ſhaped, and compoſed of five obtuſe ſubovatepetals, with the ſame number of ſtamina. The fruit is an oval unilocular capſule, containing a great number of very ſmall ſeeds.

DROWNING, the act of ſuffocating, or being ſuffocated, by water.

Naturaliſts and phyſicians furniſh us with divers well atteſted inſtances of ſurpriſing recoveries of perſons drowned. It is certain from repeated diſſections made on perſons drowned, that they generally have leſs water in their ſtomachs than if they had voluntarily drank a conſiderable quantity: whence it does not ſeem expedient to hang the drowned perſon by the heels, a poſition that muſt prove uneaſy as ſoon as the humours of the body ſhould reſume their ordinary motion. In order to know whether the perſon has ſwallowed too much water, or not, and to make him vomit it up if he has, it is proper to put him in a tun open at both ends, which is to be rolled in different directions; or the bearded end of a feather ſhould be introduced into the œſophagus. After taking off the cloaths of the drowned perſon, we ought, with the utmoſt expedition, to ſhelter him from the impreſſions of the cold air, and begin to warm him by wrapping him up with cloaths and coverings: to do this more effectually, he is afterwards to be put into a pretty warm bed, applying alſo to his body hot napkins and cloths. A hot ſcorching ſun, to which drowned perſons have been expoſed, and hot baths, have produced the ſame happy effects.

The great intention to be purſued is to put the ſolid parts of the machine in action, that thus they may reſtore the motion of the fluids: in order to this, the drowned perſon ſhould be agitated in various directions, in a bed, in the arms of perſons of ſufficient ſtrength.

Spirituous liquors or warm urine ſhould be poured into his mouth, and ſome perſons preſcribe a decoction

tion of pepper and vinegar, as a gargariſm; we muſt alſo attempt to irritate the internal fibres of the noſe, either by volatile ſpirits, and by the liquors uſed in apoplectic caſes; or by tickling the nerves of the noſtrils with a bearded feather, or by blowing through a quill, ſnuff, or ſome other more powerful ſternutatory. One of the means frequently uſed with ſucceſs, is to blow warm air, by means of a pipe, into their mouths; or to introduce it by a pair of bellows; or, by injecting warm clyſters, to irritate the inteſtines: the ſmoke of tobacco conveyed into the inteſtines, by means of a tobacco-pipe, is much recommended. Venæſection is by no means to be neglected; and perhaps moſt ſucceſsfully in the jugular vein; and when all theſe meaſures prove unſucceſsful, the laſt recourſe is bronchotomy. See the article BRONCHOTOMY.

DRUG, a general term for goods of the druggiſt and grocery kinds, eſpecially for thoſe uſed in medicine and dying.

DRUGGET, in commerce, a ſtuff ſometimes all wool, and ſometimes half wool and half thread, ſometimes corded, but uſually plain.

DRUIDS, the prieſts among the ancient Britons and Gauls.

The word is formed from the Celtic, *deru*, an oak; becauſe they held that tree in the higheſt veneration.

Their antiquity is eſteemed equal to that of the Brachmans of India, the Magi of Perſia, and the Chaldees of Babylon. And whoever conſiders the ſurpriſing conformity of their doctrine, will find ſufficient reaſon to think that they all derived it from the ſame hand, we mean from Noah and his immediate deſcendants, who carried it with them at their diſperſion; for it cannot be ſuppoſed that the Britiſh druids derived their doctrine from any foreign ſect, to whom they were abſolutely unknown.

But the druids were not contented with the power annexed to the prieſthood; they introduced religion into every tranſaction both public and private, ſo that nothing could be done without their approbation; and by this means their authority was rendered almoſt abſolute. They elected the annual magiſtrates of every diſtrict, who ſhould have enjoyed, during that term, the ſupreme authority, and ſometimes the title of kings; but they could not even call a council without their approbation and advice: ſo that, notwithſtanding their pretended authority, they were in reality the creatures and ſlaves of the druids.

They exerciſed the ſame arbitrary power in their courts of juſtice; and whoever refuſed to ſubmit to their deciſions, were excluded from the public ſacrifices, which was conſidered as the greateſt puniſhment that could be inflicted. It muſt however be acknowledged, that their adminiſtration of juſtice has always been celebrated for its impartiality. The ſole management and inſtruction of youth was alſo committed to them, except the training them up in the art of war; for both they and their diſciples were not only exempted from going to war, but likewiſe from all kind of tribute.

Their garments were remarkably long; and, when employed in religious ceremonies, they always wore a white ſurplice. They generally carried a wand in their hands, and wore a kind of ornament enchaſed in gold about their necks, called the druid's egg. Their necks were likewiſe decorated with gold chains, and their hands and arms with bracelets: they wore their hair very ſhort, and their beards remarkably long.

They were all ſubordinate to a chief or ſovereign pontiff, ſtiled the arch-druid, choſen from among their fraternity by a plurality of voices; but, in caſe of a competition too powerful to be decided by a majority, the conteſt was determined by the ſword. He enjoyed his ſupremacy for life, had power to inſpect the conduct of kings, and either to elect or depoſe whenever he pleaſed.

It was one of the maxims of their religion, not to commit any thing to writing; but deliver all their myſteries and learning in verſes compoſed for that purpoſe; and theſe were in time multiplied to ſuch a number, that it generally took up twenty years to learn them all by heart. By this means their doctrines appeared more myſterious by being unknown to all but themſelves; and having no books to recur to, they were the more careful to fix them in their memory.

But what had ſtill a more direct tendency to impoſe on the public, was their pretended familiar intercourſe with the gods. And, in order to conceal at once their own ignorance, and render the impoſition leſs ſuſceptible of detection, they boaſted of their great ſkill in magic, and cultivated ſeveral branches of the mathematics, particularly aſtronomy. The latter they carried to ſome degree of perfection; for they were able to foretel the times, quantities, and durations of eclipſes; a circumſtance which could not fail of attracting reverence from an ignorant multitude, who were perſuaded that nothing leſs than a ſupernatural power was ſufficient to make ſuch aſtoniſhing predictions: they alſo ſtudied natural philoſophy, and practiſed phyſic.

DRUM, a military muſical inſtrument, uſed principally amongſt the foot, to call the ſoldiers together, direct their marches, attacks, and retreats. The body of the drum is of a very thin oak, bent into a cylinder, and covered with parchment, which is ſtrained or braced, more or leſs, according to the height or depth of the tone required, by ſtrings, and ſtruck with ſticks. The height of the drum is equal to its breadth, which does not exceed two feet and an half, becauſe no ſkins can be procured to cover bigger.

There are alſo drums whoſe bodies are braſs, called kettle-drums, which are rounded in the bottom like a baſon; they are uſed among the horſe:

to be played on ; they are laid acroſs the ſhoulders of the horſe before the drummer, who, with a variety of ſingular geſtures, beats them with two little iron bars with balls at the end ; their ſound is ſofter and more agreeable than that of the common drum, and theſe are oftener uſed in operas, oratorios, tragedies, and concerts. There are divers beats of the drum, as the chamade, charge, march, double march, aſſemblie, retreat, &c.

DRUM, or DUMMER, he that beats the drum, of whom each company of foot has one, and ſometimes two. Every regiment has a drum-major, who has the command over the other drums.

DRUM *of the Ear*, in anatomy. See TYMPANUM.

DRUM, in architecture. See TAMBOUR.

DRUNKENNESS, *Ebrietas*, phyſically conſidered, conſiſts in a preternatural compreſſion of the brain, and a diſcompoſure of its fibres, occaſioned by the fumes or ſpirituous parts of liquors.

DRUPE, among botaniſts, a kind of pericarpium, conſiſting of a ſoft, fleſhy, and ſucculent pulp, with a nucleus, or kernel in its center.

DRY MEAT, in the manege, is uſed for corn and hay. After taking the horſe from graſs he is houſed, and put to dry meat.

DRYADS, *Dryades*, in the heathen theology, a ſort of deities, or nymphs, which the ancients thought inhabited groves and woods. They differed from the Hamadryades ; theſe latter being attached to ſome particular tree, with which they were born, and with which they died ; whereas the Dryades were goddeſſes of trees and woods in general.

DUCAT, a coin current in Germany and other countries abroad, for the different values of which ſee EXCHANGE.

DUCATOON, a ſilver coin, likewiſe frequent in ſeveral parts of Europe.

DUCK, *Anas*, in ornithology, a genus of birds ſufficiently known.

There are two ſorts of ducks common in England, the tame and wild ; the firſt of which is very beneficial to huſbandmen, and at the ſame time requires no charge to keep, living on loſt corn, worms, ſnails, &c. Indeed once a year this fowl is a great layer of eggs ; and when ſhe ſits, muſt be carefully fed with barley or other grain. As to the ducklings, they are fed in the ſame manner as goſlings, and may be fattened in three weeks time, by giving them any kind of pulſe or grain, and plenty of water.

DUCT, or DUCTUS, in general, denotes any tube or canal.

It is much uſed by anatomiſts, who mention the adipoſe ducts, concerning the reality of which authors are not agreed ; the thoracic, or chyliferous duct ; the excretory ducts of the glands ; the hepatic duct, or porus bilarius ; the ſalival ducts ; the lachrymal ducts ; the ductus communis choledochus, &c. concerning all which it is to be obſerved, that their uſe is to convey certain animal fluids ſecreted in the glands of the parts to which they ſeverally belong : thus it is, the ſalival ducts diſcharge the ſaliva, or pellucid liquor, ſecreted in the glands of the mouth ; and ſo of the reſt.

DUCTILITY, in phyſics, a property of certain bodies, whereby they are capable of being expanded or ſtretched forth, by means of a hammer, preſs, &c.

The vaſt ductility of ſome bodies, eſpecially gold, is very ſurpriſing. See DIVISIBILITY.

DUEL, is a ſingle combat, at a time and place appointed, in conſequence of a cartel or challenge.

The word is derived from the Latin, *duellum*, *quaſi duorum bellum*, a combat between two perſons.

Authoriſed duels were ſuch whoſe motive was the good of their country, when one, or a ſmall number of combatants, were choſen to ſave the blood of a whole army, and decide, by victory or death, the quarrels of kings or whole nations. Thus Goliath and David, the Horatii and Curiatii, and ſeveral others.

Duelling was ſo general a method of determining differences among the nobles, that even eccleſiaſtics were not excuſed ; only, to prevent their being ſtained with blood, they procured champions to fight for them. None were excepted from combat, but ſick people, cripples, and ſuch as were under twenty-one years of age, or above ſixty. Juſts and tournaments, doubtleſs, rendered duels more frequent.

We have good proof that duelling was authorized before the Normans came into England, though not ſo frequent and ſolemn as after the Conqueſt. Theſe are, however, now known no longer, and we could wiſh the private practice of duelling was alſo buried in oblivion.

DUKE is either the title of a ſovereign prince, as the duke of Savoy, Parma, &c. the grand duke of Tuſcany, Muſcovy, &c. or it is the title of honour and nobility next below princes.

DULCIFYING, in pharmacy, is the ſweetening, or rendering inſipid, any matter impregnated with ſalts, by waſhing it in pure water.

The word is formed from the Latin, *dulcis*, ſweet, and *facio*, to make.

DULEDGE, in gunnery, a peg of wood which joins the ends of the ſix felloes that form the round of a wheel of a gun-carriage. The plate of iron on the outſide of the wheel, which ſtrengthens the joint, is called the duledge-plate.

DUNG, in agriculture, is of ſeveral ſorts, as of horſes, cows, ſheep, hogs, pigeons, geeſe, hens, &c. All kinds of dung contain ſome matter, which, when mixed with the ſoil, ferments therein, and, by that fermentation, diſſolves the texture of the earth, and divides and crumbles its particles very much. This is the real uſe of dung in agriculture ;

for, as to the pure earthy part of it, the quantity is ſo very ſmall, that it bears an extremely inconſiderable proportion to that of the earth it is intended to manure.

DUNGEON, or DONJON, in fortification, is commonly a large tower or redoubt of a fortreſs, whither the garriſon may retreat, in caſe of neceſſity, and capitulate with greater advantage.

DUNG-MEERS, in huſbandry, places where ſoils and dungs are mixed and digeſted together: for this purpoſe it is uſual to dig a pit ſufficient to hold the ſtock of ſoil the huſbandman is capable of making; and to prepare it at the bottom with ſtone and clay, that it may hold water, or the moiſture of the dung; and beſides, it ſhould be ſo ſituated that the ſinks and drips of the houſes and barns may run into it. Into this pit they caſt refuſe fodder, litter, dung, weeds, &c. where they lie and rot together, till the farmer have occaſion for it.

DUO, or DUET, in muſic, a ſong or compoſition to be performed in two parts only; one ſung, and the other played on an inſtrument, or by two voices alone: it is alſo called a duo, when two voices ſing different parts, accompanied with a third, which is a thorough baſs. Uniſons and octaves muſt be rarely uſed in duo's, except at the beginning and end.

DUODENUM, in anatomy, the firſt of the ſmall inteſtines, ſo called becauſe it is about twelve fingers breadth in length. It begins at the right orifice of the ſtomach, then turns towards the ſpine, and ends on the left ſide, where the circumvolutions begin. It is a kind of ſuccedaneous ſtomach; and performs the like functions, as appears from its internal ſtructure, which is the ſame with that of the ſtomach, for the glandulous villoſe coat, out of which their conſtantly diſtils a ſolvent juice in the ſtomach, is continued through the duodenum. Beſides this glandulous coat, the duodenum is furniſhed with innumerable ſmall glands, which, upon the ſeparation of the tunica villoſa, are very conſpicuous in the nervous coat, and which were firſt diſcovered by the famous Brunnerus. Beſides, it has alſo ſome peculiar and remarkable ducts, which diſcharge into its cavity a highly active menſtruum: for the bilious juice runs in a leſs quantity from the gall bladder, but in a larger from the liver and its biliary ducts. In like manner the duct emerging from the pancreatic gland, which is remarkably large, conveys into it a great quantity of lymph of a ſolvent nature: and it is farther obſervable, that theſe two ducts run together in a human body, and their orifices end in a papilla, and are directly placed over the bottom of the flexure of the duodenum, that the liquids conveyed by theſe ducts might deſcend drop by drop on the ſubjacent maſs of chyle. We do not obſerve any lacteals in the duodenum, and conſequently there is no ſuch ſecretion made there, as in the other inteſtines, particularly the jejunum; and for this reaſon the meſentery does not reach to the duodenum, though all the other ſmall inteſtines adhere to it. It is very obſervable, that there is not any animal but what has this flexure of the inteſtine, or little ſuccedaneous ſtomach; and that no animal is without the bilious juice, which is generated in the liver, and poured copiouſly into the duodenum; which manifeſtly proves, that nature has exerted her utmoſt ſkill in faſhioning this part of the body, ſo neceſſary for the preſervation of the life and health of animals.

DUPLE *Ratio*, in mathematics, is when any number or quantity is contained in another twice; as 6 is in a duple ratio to 3.

Sub-DUPLE *Ratio*, in mathematics, is when any number or quantity is contained in another twice; thus 3 is ſaid to be ſub-duple to 6.

DUPLICATE *Ratio*, is a ratio compounded of two ratios; as the duplicate ratio of a to b is the ratio of aa to bb, or the ſquare of a to the ſquare of b.

In a ſeries of geometrical proportionals, the firſt term to the third is ſaid to be a duplicate ratio of the firſt to the ſecond: Thus, in 2, 4, 8, 16, the ratio of 2 to 8 is duplicate to that of 2 to 4; ſo that duplicate ratio is the proportion of ſquare, as triplicate is of cubes, &c. and the ratio of 2 to 8 is ſaid to be compounded of that of 2 to 4, and of 4 to 8.

DUPLICATION is the doubling of any thing, or multiplying of it by 2: it is alſo the folding of any thing back again on itſelf.

DUPLICATION *of the Cube*, is to find the ſide of a cube that ſhall be double in ſolidity to a given cube, which is a famous problem cultivated by the geometricians theſe two thouſand years.

It was firſt propoſed by the oracle of Apollo at Delphos; which, being conſulted about the manner of ſtopping a plague then raging at Athens, returned for anſwer, that the plague ſhould ceaſe when Apollo's altar, which was cubical, ſhould be doubled. Upon this, they applied themſelves, in good earneſt, to ſeek the duplication of the cube, which hence-forward was called the Delian problem.

The ſolution of this problem depends upon finding two mean proportionals between two given lines: for if the ſide of a given cube be $= a$, and the ſide of a double cube be $= y$, then will $2a^3 = y^3$; or putting $b = 2a$, it will be $aab = y^3$; therefore it will be $aa : yy :: y : b$; or, making $z = \frac{yy}{a}$, it will be $a : z :: y : b$; ſo that theſe four quantities will be continual proportionals: conſequently y, the ſide of the cube ſought, is the ſecond of two mean proportionals between a and b.

DUPLICATURE, among anatomiſts, is the doubling of any membranes, when they run off to ſome diſtance, and return again.

DUPONDIUS, in antiquity, the weight of two pounds; alſo a piece of money equal to two as's in value.

The word is derived from the Latin, *duo*, two, and *pondo*, a pound weight.

DURA Mater, in anatomy, one of the membranes, or meninges, as they are called, which ſurround the brain. See the article *Dura* Mater.

DURATION, an idea which we get by attending to the fleeting and perpetually periſhing part of ſucceſſion; the idea of ſucceſſion being acquired by reflecting on that train of ideas which conſtantly follow one another in our minds, as long as we are awake. The ſimple modes of duration are any different lengths of it whereof we have diſtinct ideas; as hours, days, years, time, eternity, &c.

Duration, as marked by certain periods and meaſures, is what we moſt properly call time. See the article Time.

Duration *of Action*, according to Ariſtotle, is confined to a natural day in tragedy; but the epopea, according to the ſame critic, has no fixed time.

DUTCHY, in geography, an appellation given to the dominions of a duke. See the article Duke.

Dutchy-Court, a court of the dutchy-chamber of Lancaſter, held at Weſtminſter, before the chancellor of the ſame, for matters concerning the lands and franchiſes of that dutchy.

DUTY, in general, denotes any thing that one is obliged to perform.

Duty, in polity and commerce, ſignifies the impoſt laid on merchandizes, at importation or exportation, commonly called the duties of cuſtoms; alſo the taxes of exciſe, ſtamp-duties, &c.

Duty, in the military art, is the exerciſe of thoſe functions that belong to a ſoldier.

DUUMVIRATE, the office or dignity of the duumviri.

The duumvirate laſted till the year of Rome 388, when it was changed into decemvirate.

DWAL, in heraldry, the herb night-ſhade, uſed by ſuch as blazon with flowers and herbs, inſtead of metals and colours, for ſable or black.

DYE, in architecture, any ſquare body, as the trunk, or notched part of a pedeſtal, or it is the middle of the pedeſtal, or that part included between the baſe and the corniche, ſo called becauſe it is often made in the form of a cube or dye.

DYEING, the art of giving a laſting colour to ſilks, cloths, and other ſubſtances, whereby their beauty is much improved, and value enhanced.

The art of dyeing may be divided into as many branches as there are different colours to be communicated, and ſorts of different ſtuffs to be ſubjects of it.

Dyeing of cloths, ſerges, druggets, and other woollen manufactures. For black, in cloths and ſtuffs of price, it is begun with a ſtrong decoction of woad and indigo, which give a deep blue; after which, the ſtuffs, being boiled with alum and tartar, or pot-aſhes, are to be maddered with common madder; then dyed black with Aleppo galls, copperas, and ſumac; and finiſhed by back boiling in weld. Scarlet is dyed with kermes and cochineal, with which may alſo be uſed agaric and arſenic. Crimſon-ſcarlet is given with cochineal-meſtich, aqua fortis, ſal armoniac, ſublimate, and ſpirit of wine. Violet, ſcarlet, purple, amaranth, and panſy-ſcarlet, are given with woad, cochineal, indigo, braziletto, brazil, and orchal. For common red, pure madder is uſed, without other ingredients. Crimſon-reds, carnations, flame, and peach-colours, are dyed, according to their ſeveral hues, with cochineal-meſtich, without madder, or the like. Crimſon-red is prepared with Roman alum, and finiſhed with cochineal. Peach-colour muſt be back boiled a little with galls and copperas, or the like. Orange aurora or golden yellow, brick-colour, and onion-peel colour, are given with woad and madder, tempered according to their reſpective ſhades. For blues, the dark are given with ſtrong tincture of woad: the brighter with the ſame liquor, as it weakens in working. Dark browns, minims, and tan-colours, are given with woad, weaker in decoction than for black, with alum and pot-aſhes; after which, they are maddered higher than black: for tan-colours, a little cochineal is added. Pearl-colours are given with galls and copperas; ſome are begun with walnut-tree roots, and finiſhed with the former; though, to make them more ſerviceable, they dip them in a weak tincture of cochineal. Greens are begun with woad, and finiſhed with weld. Pale-yellows, lemon-colours, and ſulphur-colours, are given with weld only. Olive colours of all degrees are firſt put in green, and taken down again with ſoot, more or leſs, according to the ſhade required. Feulemont, hair colour, muſk, and cinnamon-colour, are given with weld and madder. Nacarat, or bright orange red, is given with weld and goats-hair, boiled with pot-aſhes. Fuſtic here is forbid, as a falſe colour.

Dyeing *of Wools for Tapeſtry* is performed after the ſame manner as cloths, excepting blacks, which are only to be woaded, and then put in black as above.

Black wools for cloths and ſerges may be begun with walnut-tree root, and walnut rinds, and finiſhed by dipping in a vat of black.

Dyeing *of Silks* is begun by boiling them with ſope, &c. then ſcowering and waſhing them out in the river, and ſteeping them in alum-water cold. For crimſon they ſcour them a ſecond time before putting them in the cochineal vat.

Red crimſon is dyed with pure cochineal-meſtich, adding galls, turmeric, arſenic, and tartar, all put together in a copper of fair water almoſt boiling: with theſe the ſilk is to be boiled an hour and an half; after which, it is ſuffered to ſtand in the liquor till next day. Violet-crimſon is alſo given with pure cochineal, arſenic, tartar, and galls; but the galls in leſs proportion than in the former: when taken out, it is to be well waſhed, and put in a vat of indigo. Cinnamon-crimſon is begun like the violet, but finiſhed by back-boiling, if too bright, with copperas; if dark, with a dip in indigo. Light-blues are given in a vat of indigo. Sky-blues are begun with orchal, and finiſhed with indigo: for citron-colours, the ſilk is firſt alumed, then welded, with a little indigo. Pale yellows, after aluming, are dyed in weld alone. Pale and brown auroras, after aluming, are welded ſtrongly, then taken down with rocou diſſolved with pot-aſhes. Flame-colour is begun with rocou, then alumed, and dipped in a vat or two of brazil. Carnation, and roſe-colours, are firſt alumed, then dipped in brazil. Cinnamon-colour, after aluming, is dipped in brazil and braziletto. Lead-colour is given with fuſtic, or with weld, braziletto, galls, and copperas. But the galls, on theſe and other occaſions, are not to be uſed, becauſe they increaſe the weight to the damage of the purchaſer; for which reaſon, it is puniſhed in France as a fraud: in reality, few but black ſilks need galls.

Black ſilks, of the coarſer ſorts, are begun with ſcowering them with ſoap, as for other colours; which done, they are waſhed out, wrung, and boiled an hour in old galls, where they are left to ſtand a day or two; after which they are waſhed again with fair water, wrung, and put in another vat of new and fine galls; then waſhed and wrung again, and finiſhed in a vat of black. Fine black ſilks are only put once into galls, viz. the new and fine ſort, which has only boiled an hour; then they are waſhed, and wrung out, and dipped thrice in black, to be afterwards brought down by back boil- with ſoap.

Dyeing *of Thread* is begun with ſcowering it in lye of good aſhes; after which it is wrung, rinſed out in river water, and wrung again. For a bright blue, it is given with braziletto and indigo. Bright green is firſt dyed blue, then back-boiled with braziletto and verdeter, and laſtly woaded. For a dark green, it is given like the former, only darkened more before woading. Lemon, or pale yellow, is given with weld, mixed with rocou. Orange and iſabella, with fuſtic, weld, and rocou. Red, both bright and dark, with flame colour, &c. are given with brazil, either alone, or with a mixture of rocou. Violet, dry roſe, and amaranth, are given with brazil, taken down with indigo. Feulemort, and olive-colour, are given with galls and copperas, taken down with weld, rocou, or fuſtic. Black is given with galls and copperas, taken down and finiſhed with braziletto wood.

Dyeing *of Hats* is done with braziletto, galls, copperas, verdigriſe, diſſolved and boiled in a copper, capable of receiving, beſides the liquor, twelve dozen of hats on their blocks, or moulds. Here the hats are ſuffered to boil ſome time; after which they are taken out, and ſuffered to ſtand and cool; then dipped in again; and thus alternately, oftener or ſeldomer, as the ſtuff is of a nature to take the dye with more or leſs difficulty.

Proof of Dyes.—There are divers ways of proving the truth of dyes, or examining the juſtneſs and legitimacy of their compoſition. To diſcover whether a cloth has been duly treated by the dyer, and the proper foundation laid, a white ſpot, by the French called roſette, of the bigneſs of a ſhilling, ought to be left; beſides a white ſtripe between the cloth and the liſt.

Farther proof is had by boiling the dyed ſtuff in water, with other ingredients, different according to the quality of the dye to be proved. If the colour ſuſtain the teſt, i. e. do not diſcharge at all, or very little, ſo that the water is not tinctured by it, the dye is pronounced good: otherwiſe, falſe.

Dyeing *of Leather, Skins, &c.*—Blue is given by ſteeping the ſubject a day in urine and indigo, then boiling it with alum: or it may be given by tempering the indigo with red wine, and waſhing the ſkins therewith. Red is given by waſhing the ſkins, and laying them two hours in galls, then wringing them out, dipping them in a liquor made with liguſtrum, alum, and verdigriſe in water; and laſtly, in a dye made of brazil wood, boiled with lye. Purple is given by wetting the ſkins with a ſolution of roche alum in warm water, and, when dry again, rubbing them with the hand with a decoction of log-wood in colder. Green is given by ſmearing the ſkin with ſap green and alum-water boiled: to darken the colour, a little more indigo may be added. Dark-green is alſo given with ſteel filings and ſal armoniac ſteeped in urine till ſoft, then ſmeared over the ſkin; which is to be dried in the ſhade. Sky-colour is given with indigo ſteeped in boiling water, and the next morning warmed and ſmeared over the ſkin. Yellow, by ſmearing the ſkin over with aloes and linſeed-oil diſſolved and ſtrained: or by infuſing it in weld. Orange-colour is given by ſmearing with fuſtic-berries boiled in alum water: or, for a deep orange, with turmeric.

Dyeing, or Staining, *of Wood for inlaying, vaneering, &c.*—Red is done by boiling the wood in water and alum; then taking it out, adding brazil to the liquor, and giving the wood another boil in it. Black, by bruſhing it over with log-wood boiled in vinegar, hot: then waſhing it over with a decoction of galls and copperas, till it be of the hue required. Any other colour may be given by ſqueezing out the moiſture of horſe-dung through a ſieve, mixing it with diſſolved roche alum and gum-arabic; and to the whole adding green, blue, or any other colour deſigned: after ſtanding two or three days, pear-tree, or other wood, cut to the thickneſs of half-a-crown, is put into the liquor boiling hot, and ſuffered to remain till it be ſufficiently coloured.

Dyeing *of Bone*, *Horn*, *or Ivory*—Black is performed by ſteeping braſs in aqua-fortis till it be returned green: with this the bone, &c. is to be waſhed once or twice; then put in a warmed decoction of log-wood and water. Green is begun by boiling the bone, &c. in alum-water; then with verdigriſe, ſal ammoniac, and white-wine vinegar; keeping it hot therein till ſufficiently green. Red is begun by boiling it in alum-water, and finiſhed by decoction in a liquid compounded of quick-lime ſteeped in rain-water, ſtrained, and to every pint an ounce of brazil-wood added. In this decoction the bone, &c. is to be boiled till ſufficiently red.

Dyeing, or Staining, *Horn to imitate Tortoiſe-Shell.*—The horn to be dyed muſt be firſt preſſed into proper plates, ſcales, or other flat form; and the following mixture prepared.

" Take of quick-lime two parts, and of litharge one part; temper them together to the conſiſtence of a ſoft paſte with ſoap-lye.". Put this paſte over all the parts of the horn, except ſuch as are proper to be left tranſparent, in order to give it a nearer reſemblance of the tortoiſe-ſhell. The horn muſt remain in this manner covered with the paſte till it be thoroughly dry; when the paſte being bruſhed off, the horn will be found partly opaque and partly tranſparent, in the manner of tortoiſe-ſhell; and when put over a foil, of the kind of latten, called aſſidue, will be ſcarcely diſtinguiſhable from it. It requires ſome degree of fancy and judgment to diſpoſe of the paſte in ſuch a manner as to form a variety of tranſparent parts, of different magnitudes and figures, to look like the effect of nature; and it will be an improvement to add ſemi-tranſparent parts: which may be done by the mixing whiting with ſome of the paſte to weaken its operation in particular places; by which ſpots of a reddiſh brown will be produced, which, if properly interſperſed, eſpecially on the edges of the dark parts, will greatly increaſe both the beauty of the work, and its ſimilitude with the real tortoiſe-ſhell.

Dyeing, or Staining, *Paper or Parchment yellow*—Paper may be ſtained yellow by the tincture of French berries, prepared by boiling them in water with a little alum: but a much more beautiful yellow may be obtained by uſing the tincture of turmeric, formed by infuſing an ounce or more of the root, powdered, in a pint of ſpirit of wine. This may be made to give any teint of yellow, from the lighteſt ſtraw to the full colour called French yellow; and will equal in brightneſs the beſt dyed ſilks. If yellow be wanted of a warmer or redder caſt, annotto, or dragon's-blood, muſt be added to the tincture.

The beſt method of uſing theſe, and the following tinctures, is to ſpread them even on the paper or parchment by means of a broad bruſh in the manner uſed in varniſhing.

Dyeing, or Staining, *Paper, or Parchment. red.*—Paper or parchment may be ſtained red with the common red ink. It may be ſtained of a ſcarlet hue by tincture of dragon's-blood in ſpirit of wine; but this will not be bright.

A very fine crimſon ſtain may be given to paper, by a tincture of the Indian lake; which may be made by infuſing the lake ſome days in ſpirit of wine; and then pouring off the tincture from the dregs.

Dyeing, or Staining, *Paper, or Parchment, green.*—Paper, or parchment, may be ſtained green by a ſolution of verdigriſe in vinegar; or by the cryſtals of verdigriſe diſſolved in water. As alſo by the ſolution of copper in the aqua-fortis, made by adding filings of copper gradually to the aqua-fortis, till no ebullition enſues; or ſpirit of ſalt may be uſed in the place of aqua-fortis.

Dyeing, or Staining, *Paper, or Parchment, blue.*—A blue colour may be given to paper or parchment by ſtaining it green by any of the above methods, and then bruſhing it over with a ſolution of pearl-aſhes. It may alſo be done by a ſolution of indigo procured at the dyers.

Dyeing, or Staining, *Paper, or Parchment, orange.*—Stain the paper or parchment of a full yellow, by means of the tincture of turmeric as above directed; then bruſh it over with a ſolution of fixed alkaline ſalt, made by diſſolving half an ounce of pearl-aſhes, or ſalt of tartar, in a quart of water, and filtering the ſolution.

Dyeing, or Staining, *Paper, or Parchment, purple.*—Paper or parchment may be ſtained purple by orchal; or by a tincture of log-wood. The juice of ripe privet-berries, expreſſed, will alſo give a purple dye to paper or parchment.

DYKE, or Dike. See the article Dike.

DYNASTY, among ancient hiſtorians, ſignifies a race or ſucceſſion of kings of the ſame line or family: ſuch were the dynaſties of Egypt.

DYSCRACY, among phyſicians, denotes an ill habit or ſtate of the humours, as in the ſcurvy, jaundice, &c.

DYSENTERY, in medicine, an exulceration of the inteſtines, attended in the beginning with an execretion of a biting, bilious humour, afterwards with abraſions of the inteſtines, and, at laſt, blood in moderate quantities is voided.

The word is derived from the Greek, δυς, importing difficulty, and εντερα, the inteſtines.

When this diſeaſe is attended with a bloody flux and ſevere gripes, the inteſtines are commonly ulcerated, and diſcharge blood; which comes away, ſometimes with liquid excrements, ſometimes with ſlime accompanied with fleſhy particles. The patient is ſeized with frequent irritations to ſtool, and a pain of the anus; he diſcharges but little at a time, and his pain is increaſed by every ſtool; and as this diſeaſe ariſes from an inflammation, there is always ſome degree of fever with it.

Wherefore, to come to a cure, the firſt thing to be done is to draw blood: then a vomit to be given, for which ipecacuanha wine is very proper, and to be repeated two or three times every third or fourth day.

During this courſe, and afterward, medicines proper for ſtopping the flux and healing the ulcerated membranes are to be adminiſtered: and of this ſort I know none better than the following bolus, compoſed of the cordial confection and French bole, each one ſcruple; Thebaic extract, one grain, given three times a day.

And it will be of ſervice to inject clyſters, either of fat broth, with the addition of Venice-treacle or electuary of ſcordium, or of the white decoction and ſtarch; or, in place of this laſt, of the chalk julep, with two or three grains of the Thebaic extract, when occaſion requires it. Laſtly, I recommend an uſeful remark, that this courſe is ſometimes rendered ineffectual by a bad habit of body. In ſuch caſes, to the foregoing method it will be proper to add medicines which correct the humours; and indeed ſome doſes of the rhubarb, with a ſmall proportion of dulcified mercury ſublimate, commonly called calomel, will prove very conducive to that end.

Beſides theſe diſeaſes, a vomica, or internal ſuppuration, is ſometimes formed in the ſtomach. This indeed ſeldom happens, but yet I have obſerved it more than once, when the patient vomited up a mixture of blood and purulent matter in large quantities.

The caſe is terrifying indeed; but yet, generally ſpeaking, it is not attended with any greater danger; and it is cured by medicines which heal the ulcerated membranes, eſpecially Locatelli's balſam. *Mead's Monita et Præcepta.*

DYSOREXY, among phyſicians, denotes a want of appetite, proceeding from a weakly ſtomach. See APPETITE.

DYSPEPSY, in phyſic, a difficulty of digeſtion; or rather a depraved digeſtion, when the aliments in the ſtomach, for want of a due ſtrength in the digeſtive organs, follow their ſpontaneous tendency, and contract an alkaline or acid putrefaction.

The word is formed from the Greek, δυς, importing difficult, or bad, and πεπτω, to correct.

DYSPNOEA, in phyſic, a difficulty of breathing.

The word is derived from the Greek, δυς, difficulty, and ϖνεω, to breathe.

A difficulty of breathing may be cauſed by any thing that can affect any part of the thorax, particularly the heart, large arteries, and lungs, by crude tubercles, vomica's, polypuſes, and ſeveral other diſorders.

DYSURIA, in medicine, a difficullty of making urine, attended with a ſenſation of heat and pain.

The word is derived from the Greek, δυς, importing painful, and ȣρον, urine.

This diſeaſe is diſtinguiſhed from a ſtrangury, as, in the latter, the urine is voided by only a drop, as it were, at a time, but, however, with pain; and from an iſchury, as in this diſorder, there is an almoſt total ſuppreſſion of urine.

DYTISCUS, water-beetle, in zoology, a genus of inſects of the order of the coleoptera, the antennæ of which are ſlender and ſetaceous, and their feet formed for ſwimming. See COLEOPTERA.

Authors enumerate a great many ſpecies of this animal, among which is the great water-beetle, the largeſt of all European beetles, being an inch and an half in length, and all over of a deep and ſomewhat gloſſy black.

E.

E, The ſecond vowel, and fifth letter of the alphabet. The letter E is moſt evidently derived from the old character Ǝ in the ancient Hebrew and Phœnician alphabets, inverted by the Greeks to this poſition E, and not from the Hebrew He ה. From the ſame origin is alſo derived the Saxon *e*, which is the firſt letter in their alphabet that differs from the Latin one. It is formed by a narrower opening of the larynx than the letter A; but the other parts of the mouth are uſed nearly in the ſame manner as in that letter.

It has a long and ſhort ſound in moſt languages: the ſhort ſound is audible in *bed*, *fret*, *den*, and other words ending in conſonants: its long ſound is produced by a final *e*, or an *e* at the end of words, as in *glebe*, *here*, *hire*, *ſcene*, *ſphere*, *interfere*, *revere*, *ſincere*, &c. in moſt of which it ſounds like *ee*; as alſo in ſome others by coming after *i*, as in *believe*, *chief*, *grief*, *reprieve*, &c. and ſometimes this long ſound is expreſſed by double *ee*, as in *bleed*, *beer*, *creed*, &c. Sometimes the final *e* is ſilent, and only ſerves to lengthen the ſound of the preceding vowel, as in *rag*, *rage*, *ſtag*, *ſtage*, *hug*, *huge*, &c. The ſound of *e* is obſcure in the following words, *oxen*, *heaven*, *bounden*, *fire*, *aire*, *maſſacre*, *maugre*, &c.

The Greeks have their long and ſhort *e*, which they call Epſilon and Eta. The French have at leaſt ſix kinds of *e*'s: the Latins have alſo a long and ſhort *e*; they alſo write *e* inſtead of *a*, as *dicem* for *dicam*, &c. and this is, no doubt, the reaſon why *a* is ſo often changed into *e*, in the præter tenſe, as *ago*, *egi*; *facio*, *feci*, &c. E was alſo a numeral letter ſtanding for 250, according to the verſe,

E quoque ducentos et quinquaginta tenebit.

EAGLE, *Aquila*, in ornithology, the Engliſh name of ſeveral ſpecies of the falcon kind. See the article FALCON.

In heraldry, the eagle is accounted one of the moſt noble bearings in armoury, and according to the learned in this ſcience, ought to be given to none but ſuch as greatly excel in the virtues of generoſity and courage, or for having done ſingular ſervices to their ſovereigns; in which caſes they may be allowed a whole eagle, or an eagle naiſſant, or only the head or other parts thereof, as may be moſt agreeable to their exploits.

EAGLE, *Aquila*, in aſtronomy. See AQUILA.

EAGLE, in architecture, a figure of that bird anciently uſed as an attribute of Jupiter, in the capitals and friezes of the columns of the temples conſecrated to that god.

EAGLE-STONE, *Ætites*, in natural hiſtory. See the article ÆTITES.

Black EAGLE, an order of knighthood, inſtituted by the elector of Brandenburgh, in 1701, on his being crowned king of Pruſſia.

The knights of this order wear an orange coloured ribbon, ſuſpending a black eagle.

White EAGLE, a like order in Poland, inſtituted in 1325, by Uladiſlaus V. on occaſion of the marriage of his ſon Caſimir to the daughter of the great duke of Lithuania.

The knights of this order wear a chain of gold, ſuſpending a ſilver eagle, crowned.

White EAGLE is alſo a term uſed by chemiſts for mercurius dulcis.

EAGLET, a diminutive of eagle, properly ſignifying a young eagle. In heraldry, when there are ſeveral eagles on the ſame eſcutcheon, they are termed eaglets.

EALDERMAN, or EALDORMAN, the ſame with alderman. See ALDERMAN.

EAR, *Auris*, in anatomy, the organ of hearing.

Anatomiſts generally diſtinguiſh the ear into external and internal; the greateſt part of the external ear conſiſts of a large cartilage, which is the baſis of all the other parts. There are two portions, the one large and ſolid, called pinna, which is the ſuperior part; the other ſmall and ſoft, called the lobe, which makes the lower part. We may likewiſe conſider two ſides in the outward ear, one turned obliquely forward, and irregularly concave; the other turned obliquely backward, and unequally convex; the foreſide is divided into four eminences and as many cavities; the firſt eminence is in the helix, which is the large folded border, or circumference of the great portion of the ear: the ſecond is the anthelix, which is the large oblong eminence ſurrounded by the helix: the third is the tragus, which is the ſmaller anterior protuberance below the anterior extremity of the helix: the fourth is the antitragus, which is the poſterior tubercle below the inferior extremity of the anthelix.

The firſt cavity is the hollow of the helix; the ſecond is the depreſſion at the ſuperior extremity of the anthelix, called foſſa navicularis; the third is the concha, or great double cavity, that lies under the anthelix, the upper bottom of which is divided from the lower by a continuation of the helix, like a tranſverſe criſta; and, laſtly, the meatus of the external ear at the bottom of the concha.

The backſide of the ear has only one conſiderable eminence, which is a portion of the convex ſide of the concha, the other portion being hid by the adheſion of the ear to the os temporis.

The external ear is fixed to the cranium by muſcles, or rather ligaments. The ſkin is a continuation of that which covers the neighbouring parts of the temporal region. The arteries of the external ear come anteriorly from the arteria temporalia, and poſteriorly from the occipitalis. The veins are branches of the jugularis externa. The portio dura of the auditory nerve gives off a branch which runs up behind the ear, to the backſide of which it ſends ſeveral filaments; and the trunk of the branch ſends likewiſe filaments to the meatus and foreſide of the ear. The ſecond vertebral pair ſends alſo a branch to the ear, the ramifications of which communicate with thoſe of the other.

The internal ear conſiſts chiefly of ſeveral bony pieces, which may be divided into four general parts; the external meatus auditorius; the tympanum, or barrel of the ear; the labyrinth; and the internal meatus auditorius; or it may be divided into immoveable or containing parts, which take in all the four already mentioned; and moveable or contained parts, which are four little bones lodged in the tympanum, called incus, malleus, ſtapes, and os orbiculare, or lenticulare.

The external auditory paſſage is about half an inch in length, running obliquely from behind forward: its cavity is almoſt oval, wider at the entry than at the middle, after which it widens again by degrees: it terminates inwardly by an even circular edge, the upper part being outward, and the lower part inward. The concave ſide of this edge is grooved quite round.

The tympanum is an irregularly hemiſpherical cavity, the bottom of it being turned inward, and the mouth joined to the circular groove. It has three remarkable eminences; the firſt is a large tuberoſity lying in the very bottom of the barrel; a ſmall irregular pyramid ſituated about the tuberoſity, the apex of which is perforated, and on one ſide of the baſis two ſmall bony filaments are often found parallel. In the third eminence is a cavity ſhaped like the mouth of a ſpoon, ſituated a little towards the anterior part of the bottom of the barrel; and at a very ſmall diſtance from its point is a little bony ridge. The principal cavities in the tympanum are the opening of the maſtoid cells, the opening of the Euſtachian tube, the bony half-canal, the feneſtra ovalis and rotunda, and the ſmall hole in the pyramid.

The incus or anvil may be divided into body and branches; the body is a large ſubſtance turned forward; the branches are two; one long turned downward, the other ſhort turned backward. The malleus is a long bone with a large head, a ſmall neck, and two apophyſes, one in the neck, the other in the handle. The ſtapes is a ſmall bone, ſo denominated from its reſemblance to a ſtirrup; it is divided into the head, legs, and baſis. The orbicular or lenticular bone lies between the head of the ſtapes and extremity of the long leg of the incus, being articulated with each of theſe.

The labyrinth is divided into three parts; the anterior, called cochlea; the middle, termed veſtibulum; and the poſterior; the labyrinth, in particular, comprehends the three ſemi-circular canals: the cochlea is a ſort of ſpiral ſhell, with two ducts, formed in the anterior part of the apophyſis petroſa, like the ſhell of a ſnail. The parts to be diſtinguiſhed in it are the baſis, the apex, the ſpiral lamina, or half-ſeptum, by which its cavity is divided into two half-canals, the ſpindle round which the cochlea turns, and laſtly, the orifice and union of the two ducts. The veſtibulum is an irregularly round cavity, leſs than the tympanum, and ſituated more inward, and a little more forward. The ſemi-circular canals are three in number; one vertical and ſuperior; one vertical and poſterior; and one horizontal.

The internal auditory hole is the backſide of the apophyſis petroſa, in ſome meaſure behind the veſtibulum and baſis of the cochlea. It is a kind of blind hole, divided into two foſſulæ; one large, the other ſmall. The large one lies loweſt, and ſerves for the portico mollis of the auditory nerve: the ſmall one is uppermoſt, and is the opening of a ſmall duct, through which the portico dura of the ſame nerve paſſes, To this latter duct Fallopius gave the name of aqueduct.

The other parts of the ear are principally the membrana tympani, the perioſteum of the barrel, the membrana maſtoidæa interna, the muſcles of the oſſicula, the parts which complete the formation of the Euſtacian tube, the arteries, veins, and nerves.

To begin with the Euſtachian tube, otherwiſe called ductus auris palatinus, and in France generally the aqueduct, which is not to be confounded with the aquæductus Fallopii: this duct reaches from the cavity of the barrel to the root of the internal ala of the apophyſis pterygoides; it is made up of two portions, one entirely bony, and the other partly bony, partly cartilaginous, and partly membranous. The Euſtachian tube is furniſhed with three muſcles, according to Valſalva; the pterygoſtaphylinus, the ſphenopterygopalatinus, and the palatoſalpingæus, ſince called by ſome, muſculus tubæ novus Valſalvæ; its uſe is to dilate and keep open this channel, as Valſalva firſt has moſt ingeniouſly obſerved.

The membrana tympani is a thin, tranſparent, flattiſh pellicle, whoſe edge is round, and ſtrongly fixed in the orbicular tube. The perioſteum of the tympanum produces that of the ſmall bones; it is likewiſe continued over the two feneſtræ, and enters the Euſtachian tube. The cellulæ maſtoidææ are very irregular cavities in the ſubſtance of the maſtoid apophyſis, which communicate with each other, and have a common opening towards the inſide, and a little above the poſterior edge of the orbicular groove.

The ligaments of the oſſicula come next in order: the incus is tied by a ſtrong ſhort ligament fixed in the point of the ſhort branch to the edge of the maſtoid opening. Between the incus and malleus we find a ſmall ſhort cartilage. The malleus is connected through the whole length of its handle, to the inſide of the membrana tympani. The malleus has three muſcles; one external, attributed to Caſſerius, and mentioned by Fabricius ab Aquapendente, is a thin faſciculus of fleſhy fibres, lying along the upper-part of the meatus auditorius, between the perioſteum and other integuments. The ſecond muſcle of the malleus is the anterior, called by Du Verney the external; it is fleſhy, long, and thin. It adheres very cloſely throughout to the Euſtachian tube; it is partly accompanied by a nerve which forms what is called the chorda tympani.

The third muſcle of the malleus is internal; it is very fleſhy and diſtinct, lying partly on the cartilaginous, and partly on the bony portion of the Euſtachian tube, and fixed by one extremity in the apophyſis petroſa; afterwards it runs along the cavity of the bony half-canal of the tympanum, where it is inveſted by a portion of the membranous or ligamentary vagina. The muſcle of the ſtapes is ſhort and thick, and lies concealed within the ſmall bony pyramid at the bottom of the tympanum. The three parts of the labyrinth are lined by a fine perioſteum, which is continued over all the ſides of their cavities, and ſhuts the two feneſtræ of their tympanum. Through the whole extent of the perioſteum of the internal ear, eſpecially the oſſicula, ſemi-circular canals, and half-canals of the cochlea, we diſcover a vaſt number of blood veſſels. The arteries come partly from the internal carotid, and partly from the arteria baſilaris, the ſmall capillary ramifications of which may be obſerved to accompany the auditory nerve through the internal foramen auditorium. *Winſlow.*

Ear, among gardeners, a name given to the leaves that firſt appear from the ſeed, which differ conſiderably from other leaves.

Ear-Wig, *forficula*, in zoology. See the article Forficula.

EARL, a Britiſh title of nobility, next below a marquis, and above a viſcount. Earls were anciently called comites, becauſe they were wont *comitari regem*, to wait upon the king for counſel and advice.

Earl *Marſhal of England*, is a great officer who had anciently ſeveral courts under his juriſdiction, as the court of chivalry, and the court of honour. Under him is alſo the herald's office or college of arms. He hath ſome pre-eminence in the court of Marſhalſea, where he may ſit in judgment againſt thoſe who offend within the verge of the king's court. This office is of great antiquity in England, and anciently of greater power than now; and has been for ſeveral ages hereditary in the moſt noble family of Howard.

EARTH, in geography, this terraqueous globe whereon we live, conſiſting of land and water.

That the earth is nearly ſpherical may be ſhewn by the following obſervations. 1. When we are at ſea on board a ſhip, we may be out of ſight of land, when the land is near enough to be viſible, if it were not hid from our eye by the convexity of the water; thus let ABCD (Plate XLI. *fig.* 8.) repreſent part of the globe of the earth; let M be the top of a mountain; this cannot be ſeen by a perſon on board a ſhip at B, becauſe a line drawn from M to his eye at E is intercepted by the convexity of the water: but let the ſhip come to C, and then the mountain will be viſible, becauſe a line may be drawn from M to his eye at F. 2. The higher the eye is, the farther will the view be extended: it is very common for ſailors from the top of the maſt of a ſhip to diſcover land or ſhips at a greater diſtance than they can do when they ſtand upon deck: thus (*fig.* 9.) the top of the tower D may be ſeen from B, the top of the maſt, when it cannot be ſeen from A, by reaſon of its being hid by the convexity of the water. 3. When we ſtand upon the ſhore, the higheſt part of a ſhip is viſible at the greateſt diſtance: if a ſhip is going from us out to ſea, we ſhall continue to ſee the maſt, after the hull or body of the ſhip diſappears, and the top of the maſt will continue to be ſeen longeſt; if a ſhip be coming towards us, the top of the maſt comes firſt into view, and we ſee more and more of it, till at laſt the hull appears: thus let the eye be at C, when a ſhip is as far off as at F, only the top of the maſt is viſible, the hull is hid behind the water; when the ſhip is nearer, as at E, the hull may alſo then be ſeen. If the ſurface of the ſea were a flat, (*fig.* 10.) a line might be drawn from any object ſituated upon it, as the ſhip D, to the eye, whether placed high or low, at A or B: in this caſe, any object upon the earth or ſea would be viſible at any diſtance which was not ſo great as to make the appearance of it too faint, or the angle under which it appears too ſmall, to be ſeen by us: an object would be viſible at the ſame diſtance, whether the eye were high or low: not the higheſt but the largeſt objects would be viſible to the greateſt diſtance, ſo that we ſhould be able to ſee the hull of a ſhip further off than the maſt: all which is contrary to experience. 4. The convexity of the water may be ſeen upon any ſtill water, as upon a river which is extended in a ſtraight line, a mile or two in length; a little boat upon the water may be ſeen, at a mile diſtance, by a man whoſe eye is any height above the water: but if he ſtoops down and lays his eye near the water, he will find the ſurface thereof riſing up in ſuch a manner as to cover the boat, and intercept his view of it. 5. Several navigators have ſailed quite round the globe; not in an exact circle, for this the winding of the ſhores, the land running out in many places into the ſea, would not admit of; but going in and out, as the ſhores happen to lie, they have held on the ſame courſe, and come home on a different ſide from that they firſt ſet out from: thus, Ferdinand Magellan, ſetting out on the weſt-ſide of Spain, continued ſailing weſtward till he returned home on the eaſt-ſide of Spain; our Sir Francis Drake, Capt. Dampier, Lord Anſon, and others, have done the like; the courſe they have ſome of them run is marked upon ſeveral maps and globes: theſe proofs are ſufficient to evince the roundneſs of the water. That the earth is alſo round is evident, if we conſider that the ocean is diffuſed all over the globe, ſo as to divide the earth, as it were, into large iſlands; and that the ſurface of the earth is not very much higher than the ſea, is evident, from the courſe of rivers, which at a moderate eſtimate are computed to have not above one mile fall in running a thouſand miles, and have their ſhores much of the ſame height; as alſo from the height of mountains, which are none of them found to be above three or four miles higher than the ſurface of the ſea: theſe experiments prove the earth and ſea to have a convex ſurface every-where. 6. All the appearances of the heaven, both at land and ſea, were the ſame as they would be if the earth were a globe, which proves it to be of that ſhape; and laſtly, in eclipſes of the moon, which are cauſed by the ſhadow of the earth falling upon the moon, as will appear under the article Eclipse. This ſhadow is always circular, whatever ſituation the earth is in at that time: now a body can be no other than a globe, which, in all ſituations, caſts a circular ſhadow: it is true the ſurface of the earth is not an exact geometrical globe, becauſe it ſinks into vallies in ſome places, and riſes into mountains in others; but theſe inequalities upon its ſurface are as inconſiderable, when compared with the magnitude of the earth, as the little aſperities upon the rind of an orange are to the bulk of the orange; and accordingly we find that mountains and vallies upon the ſurface of the earth cauſe no irregularities in its ſhadow in a lunar eclipſe, but the circumference thereof are even and regular, as if it were caſt by a body exactly globular: the diameter of the earth is about 8000 Engliſh miles; the higheſt mountain is not four miles higher than the ſurface of the ſea, which is about a 2000th part of the earth's diameter: thus it appears that the higheſt mountain bears no greater proportion to the bulk of the earth than a grain of duſt does to a common globe.

But, though the earth be ſpherical, yet it is not a true ſphere, but an oblate ſpheroid, flatted towards the poles; that is, the axis of the earth is not ſo long as the diameter of the equator. This was diſcovered by the following accident:

In 1672, M. Richer, going to Cayenne, in order to make aſtronomical obſervations, found, that his pendulum clock, which at Paris had been regulated to the mean motion of the ſun, when carried to this iſland, which is about five degrees diſtant from the equator, loſt every day two minutes and twenty-eight ſeconds. At his return he reported this experiment, and, as it ſeemed to be of ſome importance, it immediately engaged the attention of the greateſt mathematicians.

But they preſently perceived that the ſlowneſs of the pendulum muſt proceed from a diminution of the preſſure of gravity; and, conſequently, that the preſſure of gravity was leſs at Cayenne than at Paris: for, when a pendulum of a clock departs in its motion from its perpendicular, the forces which cauſes it to return is gravity; whence it follows, that the greater the degree of gravity is, the quicker its motion will be, and *vice verſa:* and, as the motion of the pendulum was ſlower at Cayenne than at Paris, the preſſure of gravity muſt be leſs. Indeed, in warm climates all rods of metal will lengthen, whence the rod of the pendulum muſt be ſomewhat longer at Cayenne than at Paris; and, conſequently, its oſcillations ſlower. But as we know in what proportion heat will lengthen pendulums, and, conſequently, how much it retards their motion, we are ſatisfied that the heats at Cayenne are not ſufficient to ſolve this phœnomenon; but it muſt, in general, flow from a diminution in the preſſure of gravity.

But from whence could proceed the cauſe of this diminution of gravity? Undoubtedly from this: every body, or particle of matter, that deſcribes a circle round a center, makes a continual effort to recede from the center. It is this force that ſtrains a ſling with a ſtone in it, while you whirl it round, and were its force ſtrong enough, would even break the ſling; this effort is called the centrifugal force; to this all revolving bodies are ſubject, and if they perform their revolution in the ſame time, it is proportioned to the greatneſs of the circle they deſcribe.

Now, ſince the earth revolves round its own axis in twenty-four hours, all the bodies or particles of matter which compoſe it will deſcribe circles; and conſequently each will, more or leſs, partake of this centrifugal force, in proportion to the circle it deſcribes. And, becauſe the particles under the equator deſcribe the greateſt circle, therefore they will have the greateſt degree of centrifugal force; and the nearer the poles a particle is ſituated, the leſs will be its degree of centrifugal force; becauſe the circle it deſcribes will be ſmaller. The whole effect of this force tends to make bodies recede from the center of the circles they deſcribe, and a part of it is oppoſite to that of gravity, whoſe force every-where impels bodies towards the center of the earth. This part of the centrifugal force continually increaſes the nearer you approach to the equator; becauſe under the circle, not only the centrifugal force is directly contrary to that of gravity, but alſo the circles deſcribed by the revolving bodies are there the greateſt. The great Sir Iſaac Newton and M. Huygins carried their calculations ſo far as to compare the quantity of the centrifugal force with gravity, and found that under the equator it was $=\frac{1}{289}$ part of gravity; that is, a body under the equator loſt the 289th part of its weight: then, conſidering that the waters of the ſea are in æquilibrio all over the earth, and ſuppoſing the earth to be formed of a homogeneous and fluid matter, or that had originally been ſo, they undertook to determine its figure by the laws of hydroſtatics.

That this fluid matter might be at reſt, and the waters continue equal on each ſide, the weight of a column of water, continued from the center to the equator, muſt of conſequence be equal to that of a column of water continued from the center to the pole; for otherwiſe they would not continue in æquilibrio; but, as the matter which formed the column continued from the center to the equator, was rendered lighter by the centrifugal force than that which compoſed the column which was continued from the center of the pole; it follows that the column at the equator muſt be longer than at the poles, and conſequently the earth is flattened at the poles.

This theory was greatly confirmed by the figure of the planet Jupiter; for as this planet is much greater than the earth, his diameter being 81155 miles, whereas the earth's is only 7964 miles; and as the revolution of this planet about its own axis is performed in 9 hours, 56 minutes, it follows, that the equatorial parts of his ſurface muſt have a prodigious velocity, which muſt conſequently cauſe him to be a ſpheroidical figure. Accordingly, the ingenious Mr. Pound diſcovered that the axis of the equator was to that of the poles, as 12 to 13.

Here the queſtion might have reſted, and had probably never been accurately ſolved, had it not been for the oppoſition it met with from M. Caſſini, though he afterwards ingenuouſly owned his miſtake. This gentleman, having meaſured the meridian of France from Dunkirk to Colliours, in Rouſſillon, declared, contrary to the opinion of all the mathematicians, that the earth, inſtead of being flattened, was lengthened towards the poles; that is, inſtead of being an oblate, it was a prolate ſpheroid, higher at the poles by about 95 miles. Sir Iſaac Newton remonſtrated, that, if this was the figure of the earth, bodies muſt be lighter, and a pendulum longer at the equator than in France, about half an inch; and that the diameter of the earth's ſhadow, from ſouth to north, muſt exceed its diameter from eaſt to weſt 2 min. 46 ſec. a twelfth part of the moon's diameter; all which was manifeſtly contrary to fact and obſervation: but even this, from ſo great a man, could not entirely remove all the ſcruples of ſome mathematicians, as they were ſupported by the obſervations and experiments of ſo diligent an artiſt as M. Caſſini.

At length the king of France, at an expence becoming a monarch who delighted in cultivating the ſciences, ſent two companies of mathematicians, the one to the equator, and the other to the arctic circle, in order to decide this affair, and accurately determine the true figure of the earth.

Were the earth a perfect ſphere, all the meridians would be circles; conſequently every degree of the meridian, like the degrees of a circle, would be equal; and every line, ſtanding at right angles, with (or upright upon) the meridian, would, if continued inwards, meet at the center. The French king's aſtronomers, by actually meaſuring a degree of the meridian, in the ſouth of France, and the ſame gentlemen meaſuring a degree of the meridian at the polar circle, found the latter exceeded the former by 86,8 Engliſh miles.

This being known, the difference of a degree at the pole from a degree at the equinoctial may be found, by examining *fig.* 11. where, let AB be the equatorial diameter, P*p* its polar diameter, RSTV a great circle in the ſphere of the fixed ſtars, and let RS be a degree on the meridian at the equinoctial, and TV a degree at the pole, and that all plumb lines are perpendicular to the plane of the horizon, then will the two plumb lines R*r* and S*s*, if continued, meet at *x*, and the ſpace or diſtance *r s* be the meaſure of one degree on the earth under the equinoctial: alſo, if the two plumb lines T*t* and V*v* be continued, they will not meet till they paſs the earth's center, and have their point of concourſe at O. And the diſtance of *v t* be the meaſure of a degree on the earth under the pole. But *r s* is the 360th part of a circle, whoſe ſemi-diameter is *r x*, the equitorial degree, and *t v* the polar degree, the 360th part of a circle, whoſe ſemi-diameter is the line *v o*. Therefore, the length of a degree of the meridian, under the equinoctial, has the ſame ratio to a degree under the pole, as the line *r x* has to the line *v o*, which was to be demonſtrated.

From whence may be drawn the following corollaries:

1. That if a hole was bored plumb down quite through the earth, it would not paſs through the

earth's center, except the place bored was under the pole, or under the equinoctial.

2. If a ſtone was to be dropped from the center of this hole, it would not fall directly down, but ſtrike againſt one ſide. And if it could find a paſſage according to its natural inclination, by the power of gravity, it would deſcribe a curve of the ſpiral kind, and would reſt at laſt at the earth's center; but if the diurnal and annual motion of the earth be taken into conſideration, the curve will be of another kind.

3. If an obſerver was at the earth's center, and the earth tranſparent, ſuch perſons as were travelling towards the poles would ſeem to him to lean forward, like men climbing the outſide of an hill, and thoſe travelling towards the equator, to lean backwards like thoſe going down an hill.

4. An obſerver upon a ſmall iſland, and under the equinoctial, having a free and open horizon, he would ſee farther, when he directed his ſight eaſt or weſt, than when it was directed north or ſouth; and that the ſpace contained within the limits of a man's view, is no where circular but juſt at the poles.

By obſervations made under the artic circle, by Meſs^{rs}. de Maupertuis, Clairaut, Camus, Le Monier, the Abbé Outhier, and M. Celſius of Upſal; the length of a degree in whoſe middle the pole was elevated 66° 31′ was found to be 57437 toiſes (a toiſe is = 6,408 Engliſh feet): but by thoſe of Mr. Picard, as corrected by the ſaid gentleman, the length of one near Paris, where the mean latitude was 48° 50′ appears to be only 56925 toiſes, differing from the former by 512 toiſes. Now, to determine the earth's true dimenſions by the foregoing theorems applied to theſe obſervations, let $S =$ Nat. ſine of 66° 33′ $s =$ that of 48° 50′ $D = 57437$, $d = 56925$, and $E = e = 1$; then $r = 3261600$, $\frac{D-d}{d} = m =, 009\frac{c}{b}\ \left(= 1 - \frac{m}{3\times\overline{SS-ss}}\right) = .9892$, $b = 3272300$, $c = 3236500$, and $b - c = 35800$ toiſes; wherefore it appears, that the length of the earth's axis, from pole to pole, is 6473000 toiſes, or 7863,2 Engliſh miles; and that the difference between it and the equitorial diameter is about $\frac{1}{92}$ part of the former, or 86,8 miles.

Motion of the EARTH. The earth has a triple motion. 1. A diurnal motion round its own axis, from weſt to eaſt, in twenty-four hours, which occaſions the perpetual ſucceſſion of days and nights. It is agreeable to reaſon that the earth ſhould revolve about its axis to account for the appearance of ſuch a vaſt number of ſtars which ſeem to perform their revolutions round the earth in twenty-four hours; for the motion of theſe ſtars, were it real, would be incredibly ſwift and beyond all imagination, becauſe their diſtance, in reſpect of us, is almoſt infinite, and the orbit they have to run round ſo prodigiouſly great, that they muſt move at leaſt 100,000 miles in a minute.—2. An annual motion round the ſun in a year, which produces the different ſeaſons, and the lengthening and ſhortening of days. Let A, B, C, D, (*fig.* 12.) repreſent the orb of the earth, in which it revolves annually round the ſun E. A and C are the places of the earth at ſpring and autumn, B its place at ſummer, and D at winter. *a* is the north pole, *b* the ſouth, *c c* the polar circle, *d d l* the parallel of London, *e e* the tropick of Cancer, *f f* the equinoctial, *e g* the ecliptick, *g g* the tropick of Capricorn, *h h* the antartick circle. Now when the earth is at A, that is, in the vernal equinox, the ſun is vertical to the point *i* of the equinoctial *f f*, and from thence equally illuminates both the poles *a* and *b*, and all other places contained in circle *a c d e f g h b*, (which, for the future, I ſhall call the ſolar horizon, becauſe it divides the day from the night). Now as London moves round in the parallel *d k l* once in 24 hours, at ſun-riſe it will be at *d*, at noon at the point *k*, and at ſun-ſet at *d l*; but when the earth is at C, London will be at *d l* at ſun-riſe, at *d* at ſun-ſet, and at *k* at midnight. Likewiſe, you may obſerve, that juſt half the parallel is inlightened at once: therefore, our days and nights are at that time equal. Obſerve the like of any other place. When the earth is at B, it is ſummer with us, but winter with our Antipodes, then is the north pole *a*, and all the places within the polar circle *c c*, continually enlightened, without immerſing under the ſolar horizon *c h*, as you may ſee the ſouth pole *h b h*, at the ſame time, continually obſcured, without any day. Then London is at *d* at noon, on *k* at ſun-ſet, and at *d l* at midnight, where you may obſerve much greater part of the parallel *d k d l*, contained in the enlightened, than in the dark part of the earth, which is the reaſon of our day's being ſo much longer than our nights at that time of the year.

But when the earth is at D, it is our winter, then is the north pole *a c c*, involved in darkneſs, without any light (ſave that of the moon and ſtars), but at the ſouth pole *h b h*, they have continual day. Then is London at *d l* at noon, on *k* at ſun-riſe, and at *d* at midnight. You may alſo note, that there is juſt as much of the parallel *d k d l*, contained in the light part of the earth, as at B was contained in the dark part; by reaſon of which, our days, in winter, are juſt the ſame length as our nights are in ſummer.

By the third motion of the earth, we mean that motion by which the poles of the world revolve about the poles of the ecliptic, and occaſion what is commonly called the preceſſion of the equinoxes, or more properly, the retrogreſſion of the earth's nodes. See the article PRECESSION.

As to the velocity of the earth's motion, and the figure and time in which it performs a revolution round the ſun, ſee the articles PERIOD and ORBIT.

Quantity of Matter in the EARTH. This arduous problem can only be ſolved by the principles of gravitation. We know the force of gravity towards our earth, by the deſcent of heavy bodies, or by calculating how much the moon falls below the tangent of her orbit: alſo by computing, from their motions, how much a primary planet falls below its tangent in a given time, and how much any of Jupiter's and Saturn's ſatellites fall below their tangents in the ſame time, we are able to determine the proportion which the gravity of a primary planet to the ſun, and of a ſatellite towards its primary, bears to the gravity of the moon towards the earth, in their reſpective diſtances. Then, from the general law of the variation of gravity, the forces that would act upon them at equal diſtances from the ſun, Jupiter, Saturn, and the earth, are computed; which give the proportion of the quantities of matter contained in theſe different bodies; that is, if we ſuppoſe the matter of the ſun to be 1, the quantities of matter in Jupiter, Saturn, and the earth, will be reſpectively $\frac{1}{1067}$, $\frac{1}{3021}$, $\frac{1}{169282}$.

The quantities of matter in theſe bodies being thus determined, and their bulk being known from aſtronomical obſervations, it is eaſy to compute their different denſities. Thus, the denſities of the ſun, Jupiter, Saturn, and the earth, have been computed to be reſpectively as the numbers 100, $94\frac{1}{2}$, 67, and 400.

Theory of the EARTH. The earth in its natural and original ſtate, Des Cartes, Burnet, Woodward, and Whiſton, ſuppoſe to have been perfectly round, ſmooth, and equable; and they account for its preſent rude and irregular form principally from the great deluge. See the article DELUGE.

M. de Buffon, arguing from the ſpheroidical figure of the earth, and the laws of hydroſtatics, ſuppoſes that the earth, as well as the other planets, are parts ſtruck off from the body of the ſun by the colliſion of comets, and conſequently, when the earth aſſumed its form, it was in a ſtate of liquefaction by fire. Of this, ſays he, we will be the more eaſily convinced, when we conſider the nature of the matter contained in the body of the earth, the greateſt part of which, as ſand and clays, are vitrified, or vitrifiable ſubſtances; and, on the other hand, when we reflect upon the impoſſibilty of the earth's being ever in a ſtate of fluidity produced by water, ſince there is infinitely more land than water; and beſides, water has not the power of diſſolving ſand, ſtones, and other ſubſtances of which the earth is compoſed. How far the inequalities in the face of the earth, the beds of rivers, lakes, &c. and the various ſtrata in its internal parts, ſerve to confirm this hypotheſis, may be ſeen in Hiſtoire Naturelle, &c. tom. 1. by M. de Buffon, and in the articles MOUNTAIN, RIVER, STRATA, &c.

Diameter of the EARTH. See DIAMETER.

Latitude of the EARTH. See LATITUDE.

Longitude of the EARTH. See LONGITUDE.

EARTH, in gardening and huſbandry, if good, may be known by the ſight, ſmell, and touch. Firſt, by the ſight. Earth that is of a brighr cheſnut or hazley colour, is accounted very good; of this colour are the beſt loams, and alſo the beſt natural earth; and this will be the better yet, if it cuts like butter, and does not ſtick obſtinately, but is ſhort, tolerably light, breaking into ſmall clods, is ſweat, will be tempered without cruſhing or chapping in dry weather, or turning to a mortar-like ſubſtance in wet. Next to this, the dark grey and ruſſet earths are accounted the beſt: the light and dark aſh-coloured are reckoned the worſt; ſuch as are uſually found on common or heathy ground: the clear tawny is by no means to be approved; but that of a yellowiſh red colour is reckoned the worſt of all; this is common in wild and waſte parts of the country, and for the moſt part produce nothing but furze and fern, according as their bottoms are more or leſs of a light and ſandy, or of a ſhingley gravel or clayey nature.—Secondly, by the ſmell. All earths that are good and wholeſome will, after rain, or breaking with the plough or ſpade, emit a ſweet ſmell.—Thirdly, by the touch. By this means we may diſcover whether it conſiſts of ſubſtances entirely arenacious or clammy; that is, whether it be harſh, gritty, porous, or friable; or tender, fat, deterſive or ſlippery; that earth being always the beſt that is between the two extremes, and is neither too unctious or too lean, but ſuch as will eaſily diſſolve, and is of a juſt conſiſtence between ſand and clay; a loam or brick earth where cattle are accuſtomed to feed, requires little help or improvement but the plough or ſpade.——Barren earth is to be known divers ways; as, when inſtead of good green graſs and a plentiful crop, it produces a thin, pale, ſmall graſs: alſo broom, furze, heath, moſs, &c. denotes barren land, eſpecially if they be ſmall. Lands ſituated near the ſea coaſt are often barren, being poiſoned and ſtarved by the vapours and ſtorms proceeding from thence. On the contrary, good earth is known where it naturally produces mallows, docks, hemlock, and other weeds of the like nature; for ſuch plants delight in fat deep earth; and it is ever to be obſerved, that ſuch ſoil as produces weeds or graſs luxuriantly, is undoubtedly rich and fruitful. For a further account of the different ſorts of earths, ſee the articles CLAY, LOAM, SAND, &c.

EARTH, in chemiſtry, the fourth of the chemical elements, or principles, into which bodies are reſolvable by fire.

EARTH-BANKS, in huſbandry, &c. are a very common fence about London, and in ſeveral other parts of England. Where ſtones are not to be had cheap, theſe are to be preferred to all other fences, both for ſoundneſs and duration.

The beſt manner of making them is this: dig up ſome turf in a graſſy place, a ſpit deep, or nearly the breadth of the ſpade, and about four or five inches thick; lay theſe turfs, with the graſs outward, even by a line on one ſide, and on the backſide of theſe lay another row of turf, having a foot ſpace of ſolid ground on the outſide, to prevent the bank from ſlipping in, if it ſhould be any ways faulty. On the outſide of this make a ditch, or elſe let the ſides be lowered both ways with a ſlope two feet deep, and there will be no paſture loſt by the fence, becauſe it will bear graſs on both ſides.

The earth that is dug out of the ditches, or from the ſlope, muſt be thrown in between the two rows of turf, till the middle is made level with the reſt: then lay on two more rows of turf in the ſame manner; and with more of the earth fill up and make level as before. Let this method be continued till the bank is raiſed four feet high, or more, if neceſſary, only obſerving, that the higher it is to be carried, the wider the foundation muſt be made. As the bank is carried up, the ſides muſt not be raiſed perpendicular, but ſloping, inward both ways, ſo that at the top it may be about two feet and a half wide. This ſort of fence, when made with leſs care, and faced with clay, is left naked, and ſerves very well in ſome places; but, when it is thus managed with the turf, the joinings of the ſeveral pieces are hid in a little time, by the growth of the graſſy part of the turf on each ſide, and it makes a beautiful fence, of as green and pleaſant a colour as the reſt of the field.

EARTHING, in gardening, ſignifies covering the roots of plants with earth, as is practiſed with aſparagus, or banking againſt their ſides with earth, in order to blanch their leaves, as is done with cellery, &c. or drawing the earth up to the plants with a hoe, as is practiſed with peas, beans, cabbages, &c.

EARTHQUAKE, in natural hiſtory, a violent agitation, or trembling, of ſome conſiderable part of the earth, generally attended with a terrible noiſe like thunder, and ſometimes with an eruption of fire, water, winds, &c.

Earthquakes are allowed to be the greateſt and moſt terrible phænomena of nature, there being no ſecurity againſt their effects, when they come with the laſt degree of violence.

There are two ſorts of earthquakes; the one cauſed by the action of ſubterraneous fires and the exploſion of the volcanos, which are not felt but at ſmall diſtances, and at the times that the volcanos are agitated, or before they begin to open: and the other from air. When the materials that form ſubterraneous fires come to be fermented, heated, and inflamed, the fire makes efforts on all ſides; and if it does not naturally find an out-let, it raiſes the earth, and makes a paſſage for itſelf by throwing it off, by which means a volcano is produced, the effects of which are repeated, and they laſt in proportion to the quantity of inflammable matter it contains: if this matter be inconſiderable, there may happen a raiſing of the ground, a commotion, and an earthquake, without any volcano being formed by that means: the air, produced and rarefied by the ſubterraneous fire, may likewiſe find ſmall outlets by which it may eſcape; and in this caſe there will only happen an earthquake without any eruption or volcano. But when there is a large quantity of inflammable matter, and when it is locked up and confined by ſolid and compact ſubſtances, there happens a commotion and volcano too: but all theſe commotions cauſe no more than the firſt ſort of earthquakes, and can only ſhake a ſmall ſpace of ground. A very violent eruption, for inſtance, of Mount Ætna, will cauſe an earthquake over the whole iſland of Sicily; but it will never extend to three or four hundred leagues diſtance. When ſome new vents of fire have been formed in Mount Veſuvius, there are felt at the ſame time earthquakes at Naples, and in the neighbourhood of the volcano; but theſe concuſſions have never ſhaken the Alps, nor been communicated to France, or other countries remote from Veſuvius: in this manner earthquakes, produced by means of volcanos, are confined to a narrow ſpace; which is properly the effect of the re-action of the fire, and they ſhake the earth, juſt as the exploſion of a powder magazine cauſes a ſenſible concuſſion at ſeveral leagues diſtance.

But there is another ſort of earthquakes very different as to their effects, and, probably as to their cauſes; and theſe are ſuch as are felt at conſiderable diſtances, and which ſhake a long tract or ſlip of ground, without any volcano or eruption appearing. We have inſtances of earthquakes that are felt at the ſame time in England, France, Germany, and even in Hungary; and theſe always extend a great deal more in length than in breadth; they ſhake a tract of ground with more or leſs violence in different places; and they are almoſt always accompanied with a dull noiſe, much like that of a large carriage that rolls along ſwiftly.

In order to underſtand thoroughly what may be the cauſes of this kind of earthquake, we muſt remember that all inflammable matters capable of exploſion, ſuch as gun-powder, generate a large quantity of air; that this air, produced by the fire, is in a ſtate of very great rarefaction; and that by means of this compreſſion, in which it finds itſelf in the bowels of the earth, it muſt produce very violent effects. Let us, therefore, ſuppoſe, that at a very conſiderable depth, as a hundred or two hundred fathoms, there be found pyrites and other ſulphureous ſubſtances, and that by the fermentation produced by the filtering of the waters, or other cauſes, theſe happen to take fire, let us ſee what will be the reſult; in the firſt place, theſe ſubſtances are not regularly diſpoſed in horizontal ſtrata; on the contrary, they are contained in the perpendicular fiſſures, in the caverns at the foot of theſe fiſſures, and in other places where the water can act, and into which they can penetrate: theſe ſubſtances, coming to take fire, will generate a large quantity of air, whoſe ſpring being compreſſed in a little room, as in that of a cavern, will not only ſhake the ſuperior ground, but ſeek for paſſages to eſcape by, and to extricate itſelf. The paſſages that preſent themſelves, are the caverns and canals formed by the ſubterraneous waters and rivulets: the rarefied air will violently precipitate into all the paſſages that are open, and form a furious wind in theſe ſubterraneous cavities, the noiſe of which ſhall be heard at the ſurface of the earth, accompanied with concuſſions thereof; this ſubterraneous wind produced by the fire, will extend as far as theſe cavities, and cauſe an earthquake more or leſs violent, in proportion as it is remote from the fire, and finds paſſages more or leſs narrow: this motion being performed lengthwiſe, the concuſſion will be in the ſame direction, and the earthquake felt in a long zone or tract of ground. This air will cauſe no eruption or volcano, becauſe it will find ſufficient room to dilate itſelf, or, rather, becauſe it will find outlets, and iſſue out in form of wind or vapour: and even ſhould it be denied that there are actually any ſubterraneous paſſages, by which this air and theſe vapours may eſcape, we may eaſily conceive, that in the very place where the firſt exploſion happens, the ground being raiſed up to a conſiderable height, the adjoining place muſt be divided and rent aſunder horizontally, in order to correſpond with the primary motion, which is ſufficient to make paſſages that may communicate the motion to a very great diſtance. This explication agrees with all the phænomena. An earthquake is not felt in the very ſame inſtant in two diſtant places; for inſtance, a hundred or two hundred leagues: there is no external eruption of fire cauſed by theſe earthquakes that reach to ſome diſtance; and the noiſe that accompanies them, almoſt always points out the progreſſive motion of the ſubterraneous fire.

What has been ſaid may be farther confirmed by connecting it with other facts. It is well known, that mines exhale vapours independently of the winds produced by the current of the waters, and that there are often obſerved in them currents of unwholſome air and ſuffocating exhalations; and beſides, there are holes, abyſſes, and deep lakes on the earth, that produce winds, as the lake of Boleſlaw, in Bohemia.

Earthquakes, it is true, are a great deal more frequent in places where volcanos are than elſewhere; as in Sicily and Naples, and it is well known from obſervations made at different times, that the moſt violent earthquakes happen at the time of the greateſt eruptions of volcanos. *Buffon's Hiſtoire Naturelle.*

Earthquakes may be produced artificially, by mixing equal quantities of ſulphur and the filings of iron, and beating them together, with an addition of water, into a kind of paſte; and burying the whole three or four feet under the ſurface of the earth; and in ſeven or eight hours time the earth will begin to tremble, crack, and ſmoke, and burſt out into flames.

EASEL-PIECES, a denomination given by painters to ſuch pieces as are contained in frames, in contradiſtinction from thoſe painted on cielings, &c.

EASEMENT, in law, a privilege or convenience which one neighbour has of another, whether by charter or preſcription, without profit: ſuch are paſſages through his lands, a ſink, or the like. Theſe, in many caſes, may be claimed.

EAST, one of the four cardinal points of the world; being that point of the horizon where the ſun is ſeen to riſe when in the equinoctial. See COMPASS, HORIZON, EQUINOCTIAL, &c.

EASTER is the great feſtival of the anniverſary commemoration of our Saviour's reſurrection; which, for its antiquity and excellence, challenges the precedence of all others.

The Greeks and Latins call it *paſcha*, originally an Hebrew word, ſignifying a paſſage, applied to the feaſt of the paſſover, held by the Jews much about the ſame time. In Engliſh it is called Eaſter, from a goddeſs of that name, worſhipped by the Saxons in the month of April.

It was in conformity to the cuſtom of the Jews, who were commanded by God himſelf to celebrate the paſſover in the firſt month, and on the fourteenth day of that month, in the even, that the primitive fathers ordered that the fourteenth day of the moon from the calendar new moon, which immediately follows after the twenty-firſt of March, at which time the vernal equinox happened upon that day, ſhould be deemed the Paſchal full-moon, and that the Sunday after, becauſe our Saviour roſe on the day after the Jewiſh paſſover, ſhould be Eaſter-day; and it is upon this account that our Rubric has appointed it upon the firſt Sunday after the firſt full moon immediately following the twenty-firſt day of March, upon which day, at that time, the vernal equinox happened: whence it appears, that the true time of celebrating Eaſter, according to the original inſtitution of the feaſt of the paſſover, as well as according to the intent of the council of Nice, was to be the firſt Sunday after the firſt full-moon immediately following the vernal equinox, or when the ſun entered into the firſt point of Aries: and this was the principal view pope Gregory had, when he reformed the calendar, to celebrate Eaſter according to the intent of the Nicene council: and as the new-ſtyle has been ordered by act of parliament to be uſed in Great-Britain for the future, it will be neceſſary to ſhew the method of finding Eaſter, according to this method of computation, which may be performed by the following rule.

Find the epact for the year propoſed, and, if it be leſs than 24, ſubtract it from 74; but if it be 24, it muſt be taken from 73; alſo, if the epact be 25, and the golden number between 12 and 19, both numbers incluſive, the epact muſt be taken from 73, and the remainder will be Eaſter limit, or the day of the Paſchal full moon. If the limit do not exceed 31, the day of the full-moon will be in March; but if it exceeds 31, it will be in April, the Sunday after which full-moon will be Eaſter-day.

But to ſave the trouble of calculation, we ſhall inſert the following table, by which Eaſter-day may be found by inſpection from the preſent time, till the year 1899 incluſive, according to the Gregorian method.

A Table to find EASTER till the year 1899 incluſive.

	SUNDAY LETTERS.						
G. Numb.	A.	B.	C.	D.	E.	F.	G.
I.	April 16	17	18	19	20	14	15
II.	April 9	3	4	5	6	7	8
III.	March 26	27	28	29	23	24	25
IV.	April 16	17	1	12	13	14	15
V.	April 2	3	14	5	6	Mar. 31	April 1
VI.	April 23	24	25	19	20	21	22
VII.	April 9	10	11	12	13	14	8
VIII.	April 2	3	Mar. 28	29	30	31	April 1
IX.	April 16	17	18	19	20	21	22
X.	April 9	10	11	5	6	7	8
XI.	March 26	27	28	29	30	31	25
XII.	April 16	17	18	19	13	14	15
XIII.	April 2	3	4	5	6	7	8
XIV.	March 26	27	28	22	23	24	25
XV.	April 16	10	11	12	13	14	15
XVI.	April 2	3	4	5	Mar. 30	31	April 1
XVII.	April 23	24	18	19	20	21	22
XVIII.	April 9	10	11	12	13	7	8
XIX.	April 2	Mar. 27	28	29	30	31	April 1

To make uſe of the preceding table, find the Sunday letter for the year in the uppermoſt line, and the golden number, or prime, in the firſt column; and in the common angle of meeting, you have the day of the month on which Eaſter falleth that year. But note, that the name of the month is ſet on the left hand, or juſt with the figure, and followeth not, as in other tables, by deſcent, but collateral.

EASTERN, an appellation given to whatever relates to the eaſt: thus we ſay, eaſtern amplitude, eaſtern church, &c. See Amplitude, Church, &c.

EAVES, in architecture, the margin or edge of the roof of an houſe; being the loweſt tiles, ſlates, or the like, that hang over the walls, to throw off water to a diſtance from the wall. See the articles Wall and Roof.

Eaves Lath, a thick feather-edged board, generally nailed round the eaves of a houſe for the lowermoſt tiles, ſlates, or ſhingles, to reſt on.

EBDOMARIUS, in eccleſiaſtical writers, an officer formerly appointed weekly to ſuperintend the performance of divine ſervice in cathedrals, and preſcribe the duties of each perſon attending in the choir, as to reading, ſinging, praying, &c.

EBENUS, the ebony-tree, in botany, a plant which grows naturally in ſeveral of the Archipelago iſlands; it riſes with a ſhrubby ſtalk three or four feet high, which puts out ſeveral ſide-branches; theſe are furniſhed with hoary leaves at each joint, which are digitated and ſpearſhaped: at the extremities of the branches iſſue forth thick ſpikes of large purple flowers, which are papilionaceous; the ſpikes are from two to three inches long, which make a fine appearance. With us it is propagated by ſeeds, which ſhould be ſown in autumn, and as the plants are not very tender, a common green-houſe will be a ſufficient ſhelter for them in winter in this climate. Ebony wood is extremely ſolid, capable of a fine poliſh, and therefore much uſed in toys and inlaid work.

EBIONITES, in church hiſtory, heretics of the firſt century, ſo called from their leader Ebion.

They held the ſame errors with the Nazarines, united the ceremonies of the Moſaic inſtitution with the precepts of the Goſpel, obſerved both the Jewiſh Sabbath and Chriſtian Sunday, and in celebrating the euchariſt, made uſe of unleavened bread. They abſtained from the fleſh of animals, and even from milk. In relation to Chriſt, ſome of them held that he was born, like other men, of Joſeph and Mary, and acquired ſanctification only by his good works. Others of them allowed, that he was born of a virgin, but denied he was the word of God, or had any exiſtence before his human generation. They ſaid he was, indeed, the only true prophet, but yet a mere man, who by his virtue had arrived at being called Chriſt, and the Son of God. They alſo ſuppoſed, that Chriſt and the devil were two principles, which God had oppoſed to each other. Of the New-Teſtament, they only received the Goſpel of St. Matthew, which they called the Goſpel according to the Hebrews.

EBONY, in botany. See the article Ebenus.

EBRBUHARITES, a kind of Mahometan monks, ſo called from their founder Ebrbuhar.

EBRILLADE, in the manege, a check of the bridle given to the horſe by a jerk of one rein, when he refuſes to turn. Some confound the ebrillade with the ſaccade.

EBULLITION, the ſame with boiling. See Boiling.

Ebullition is alſo uſed in a ſynonymous ſenſe with effervеſcence. See the article Effervescence.

ECCHYMOSIS, a livid, brown, or dark ſpot in the ſkin, cauſed by extravaſated fluids, when the capillaries are broken by a contuſion.

The word is formed from the Greek, εκχυω, to pour out, and αιμα, blood; or, perhaps, from εξ, out, and χυμος, juice or humour.

ECCLESIA, in law, ſignifies a church or parſonage. See the articles CHURCH and PARSONAGE.

ECCLESIASTES, a canonical book of the Old-Teſtament, the deſign of which is to ſhew the vanity of all ſublunary things.

It was compoſed by Solomon, who enumerates the ſeveral objects on which men place their happineſs, and then ſhews the inſufficiency of all worldly enjoyments.

The Talmudiſts make king Hezekiah to be the author of it; Grotius aſcribes it to Zorobabel, and others to Iſaiah; but the generality of commentators believe this book to be the produce of Solomon's repentance, after having experienced all the follies and pleaſures of life.

ECCLESIASTICAL, an appellation given to whatever belongs to the church: thus we ſay, eccleſiaſtical polity, juriſdiction, hiſtory, &c.

ECCLESIASTICUS, an apocryphal book, generally bound up with the Scriptures, ſo called from its being read in the church, *eccleſia*, as a book of piety and inſtruction, but not of infallible authority.

The author of this book was a Jew, called Jeſus the ſon of Sirach. The Greeks call it the Wiſdom of the ſon of Sirach.

ECCOPE, in ſurgery, the ſame with amputation.

ECCOPROTICS, in pharmacy, the ſame with gentle cathartics and evacuants. See CATHARTICS and EVACUANTS.

ECHARPE, in the military art. See the article BATTERY.

ECHEVIN, *Scabinus*, in the French and Dutch polity, a magiſtrate elected by the inhabitants of a city or town, to take care of their common concerns, and the decoration and cleanlineſs of the city.

ECHINATE *Seeds*, among botaniſts, a term uſed for ſuch as are rough and prickly, like an *echinus*, or hedge-hog.

ECHINITES, in natural hiſtory, the name by which authors call the foſſile centronia, frequently found in our chalk-pits.

ECHINOPHORA, prickly parſnip, in botany, a genus of umbeliferous plants; the coralla of which conſiſts of five unequal patulous petals, with five ſimple filaments topped with roundiſh antheræ; it has no pericarpium; the general involucrum is of a turbinated figure, and the ſeeds are two in number, of an oblong form, which are incloſed in the perianthium.

ECHINOPS, globe-thiſtle, in botany, a genus of plants whoſe flower is compound, conſiſting of a number of floſcules, which are monopetalous and infundibuliform, divided into five reflexed ſpreading ſegments, with five ſhort capillary ſtamina; there is no pericarpium; the ſeed, which is ſingle, is of an avato-oblong figure, narrower at the baſe, with an obtuſe hairy apex.—The roots and ſeeds of the common globe-thiſtle are ſaid to be attenuant and diuretic.

ECHINUS, in zoology, a name frequently uſed for the erinaceus, or common hedge-hog. See ERINACEUS.

ECHINUS, in architecture, a member or ornament near the bottom of the Ionic, Corinthian, and Compoſite capitals.

ECHIUM, viper's bugloſs, in botany, a genus of plants, the flower of which conſiſts of a ſingle petal, the tube being very ſhort, and the limb erect, growing gradually wider at the extremity, where it is divided into five unequal ſegments; the two upper ſegments are longer than the reſt, and the loweſt one is ſmall, acute, and reflex; there is no pericarpium, inſtead of which the cup becomes rigid, and contains in it four roundiſh and obliquely acuminated ſeeds.

A powder of the root of this plant is recommended againſt epilepſies: it is alſo a ſudorific, vulnerary, and preſcribed againſt the eryſepilas.

ECHO, a ſound reflected or reverberated from a ſolid, concave body, and ſo repeated to the ear. The word is formed of the Greek *ηχος*, ſound, of the verb *ηχεω*, *ſono*, I ſound.

In order to account for the nature of echoes, we muſt conſider, that ſound is perceived as coming from that place, from which, as a center, the pulſes are propagated. This is well known by experience: but to illuſtrate this matter, let A (plate XLIII. *fig.* 1.) be the center from whence any ſound is directly propagated, and ſtrikes againſt any plain obſtacle C B, ſufficiently large; draw A F perpendicular to B C, and produce it to H, ſo that it may be $AF=FH$; the ſound reflected will be perceived as coming from the point H.

2. For let A B be the incident ray, impinging againſt the obſtacle B C in the point E; from E draw the ray K D, in ſuch a manner that the angle C E D may be equal to the angle E F A, or that the angle of incidence may be equal to the angle of reflection; then will E D be the reflected ray of ſound, and, if produced, will paſs through the point H; for the angle $FEH=CED=FEA$. Therefore in the triangles A F E and E F H, ſince the angles of one are reſpectively equal to the angles of the other, and the ſide F E common to both, the ſides of one triangle will be reſpectively equal to the ſides of the other, and therefore $HF=AF$; wherefore the reflex ſound will be heard by a perſon at D, as coming from the point H.

3. As the place of the auditor, or point D approaches towards A, the caſe will conſtantly be the ſame with reſpect to the center of ſound H; the triangles will ſtill be equal, and all their angles and ſides reſpectively; therefore when D coincides with A, the reflex ſound, or echo, will be heard from the point H; which was to be demonſtrated.

4. The ſame ſound therefore is heard twice by an auditor at D; firſt by the direct ray A D, and ſecondly by the reflex ray A E D; provided the difference between A D and A E D be ſufficiently great, that the direct and reflex ſound do not in the ſame ſenſible moment of time affect the ear: for if the reflex ſound arrives at the ear before the impreſſion of the direct ſound ceaſes, the ſound will not be double, only rendered more intenſe.

5. We know by experience, if more than nine or ten ſyllables are pronounced in a ſecond, the ſounds will not be diſtinct and articulate; therefore, that the reflex ſound may not be confounded with the direct ſound, there ought to be at leaſt the ninth part of a ſecond between the times of their appulſe to the ear. But in the ninth part of a ſecond, ſound runs through the ſpace of $\frac{1142}{9} = 127$ feet; the difference therefore between A D and A E D muſt not be leſs than 127 feet, for the echo to be diſtinctly heard in D.

6. Hence alſo it follows, that a perſon ſpeaking or uttering a ſentence in A aloud, in order to obſerve the echo by reflection from the obſtacle B C, ought to ſtand at leaſt 73 or 74 feet from it, that is, $AF = 74$. And ſince, at the common rate of ſpeaking, we pronounce not above $3\frac{1}{2}$ ſyllables per ſecond (or read more than twenty lines of Engliſh poetry per minutes) therefore that the echo may return juſt as ſoon as the three ſyllables are expreſſed, we muſt have twice A F, equal to about 1000 feet; or the ſpeaker muſt ſtand about 500 feet from the obaſtcle B C; and ſo in proportion for any other number of ſyllables.

7. In all the experiments which Dr. Derham made with the guns at Blackheath, there was always a reduplication of the ſound, particularly the firſt in the foregoing table, on February 13, 1304; where the direct ſound came firſt in 120 half-ſeconds, and the reflex ſound or echo in 122 half-ſeconds. The difference in time, being a whole ſecond, ſhews the echo paſſed over 1142 feet more than the direct ſound; and that therefore the phonocamptic object, or obſtacle which reflected the ſound, was very probably near the guns; ſince after the pulſes had paſſed a great way, they would have been too weak, when reflected, to have made an echo as ſtrong or ſtronger than the direct ſound, as the doctor always found it was.

8. By ſome experiments which he made on guns fired on the river Thames, between Deptford and Cuckold's-point, he obſerved the ſound was not only doubled, but tripled, quadrupled, and ſometimes repeated many more times, and each ſucceeding echo was louder and louder; and often when he heard thoſe fragors of great guns, he obſerved a murmur aloft in the air, eſpecially if the heavens were quiet and ſerene: and thoſe pulſes of air he has obſerved to ſtrike againſt a thin cloud, and produce in it a murmur for the ſpace of 15″. From hence he judged, that thoſe murmurs in the air proceed from the vaporous particles ſuſpended in the atmoſphere which reſiſt the undulations of ſound, and reverberate them to the ear of the obſerver, in the manner of indefinite echoes.

9. Among the many pleaſant and ludicrous phænomena of echoes, thoſe which are polyphonous, or repeat divers ſyllables or ſounds diſtincty, and are therefore called tautological or prattling echoes, afford the moſt curious amuſement. Of theſe there are ſeveral remarkable in different parts of the world, and particularly here in England.

At the ſepulchre of Metello, wife of Craſſus, there was an echo which repeated what a perſon ſaid five times. Authors mention a tower in Cyzicus where the echo repeated ſeven times.

One of the fineſt echoes we read of, is that mentioned by Barthius, in his notes on Statius's Thebais, which repeated the words a perſon ſpoke ſeventeen times: this was on the banks of the Naha, between Coblents and Bingen. Barthius aſſures us he had proved what he wrote by experience, and had actually counted ſeventeen repetitions.

And whereas in common echos, the repetition is not heard for ſome time after hearing the word ſpoke, or the notes ſung; in this the perſon who ſpeaks or ſings is ſcarce heard at all, but the repetition very clearly, and always in ſurprizing varieties; the echo ſeeming ſometimes to approach nearer, and ſometimes to be farther off: ſometimes the voice is heard very diſtinctly, and ſometimes ſcarce at all; one perſon only hears one voice, and another ſeveral; one hears the echo on the right, and the other on the left, &c.

Addiſon, and other travellers into Italy, mention an echo in that country, which will return the ſound of a piſtol fifty-ſix times, even though the air be very foggy.

Echo, in architecture, is applied to certain vaults and arches, generally of elliptical or parabolical figures, erected to produce artificial echoes.

Echo, in poetry, a kind of compoſition, wherein the laſt words or ſyllables of each verſe contain ſome meaning, which, being repeated apart, anſwer to ſome queſtion or other matter contained in the verſe, as in this beautiful one from Virgil:

> *Crudelis mater magis, an puer improbus ille?*
> *Improbus ille puer, crudelis tu quoque mater.*

The elegance of an echo conſiſts in giving a new ſenſe to the laſt words; which reverberate, as it were, the motions of the mind, and by that means affect it with ſurprize and admiration.

ECHOMETER, in muſic, a kind of ſcale, having ſeveral lines divided on it, to find the intervals and ratios of ſounds.

The word is derived from the Greek ηχος, ſound, and μετρεω, to meaſure.

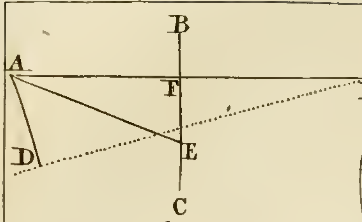
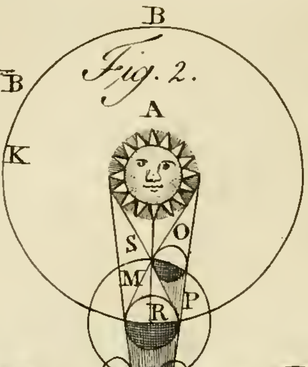


Fig. 1. Echo

Fig. 2.



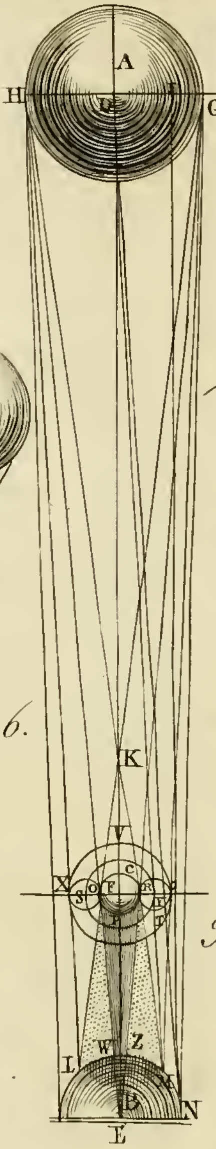


Fig 3.

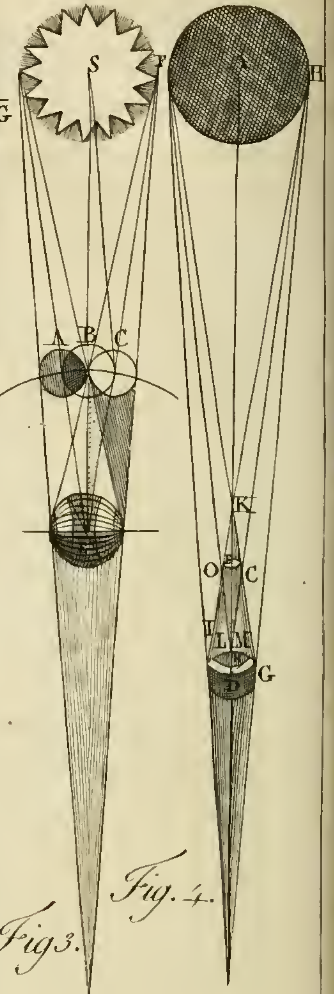


Fig. 4.

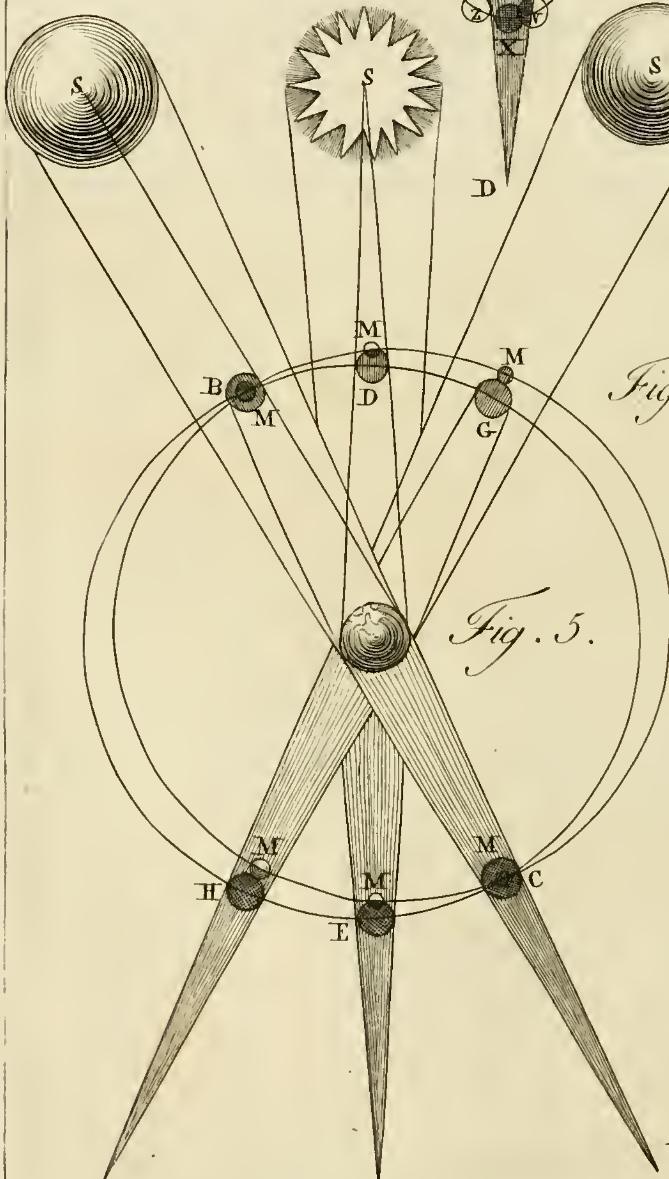


Fig. 6.

Fig. 5.

Fig. 8.

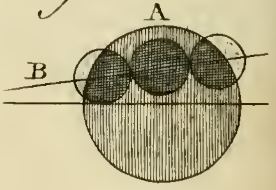
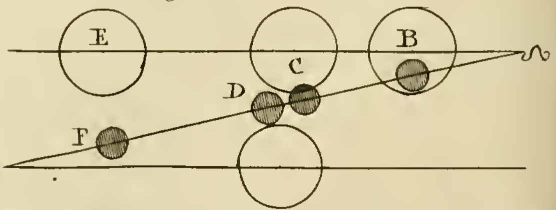


Fig. 7.



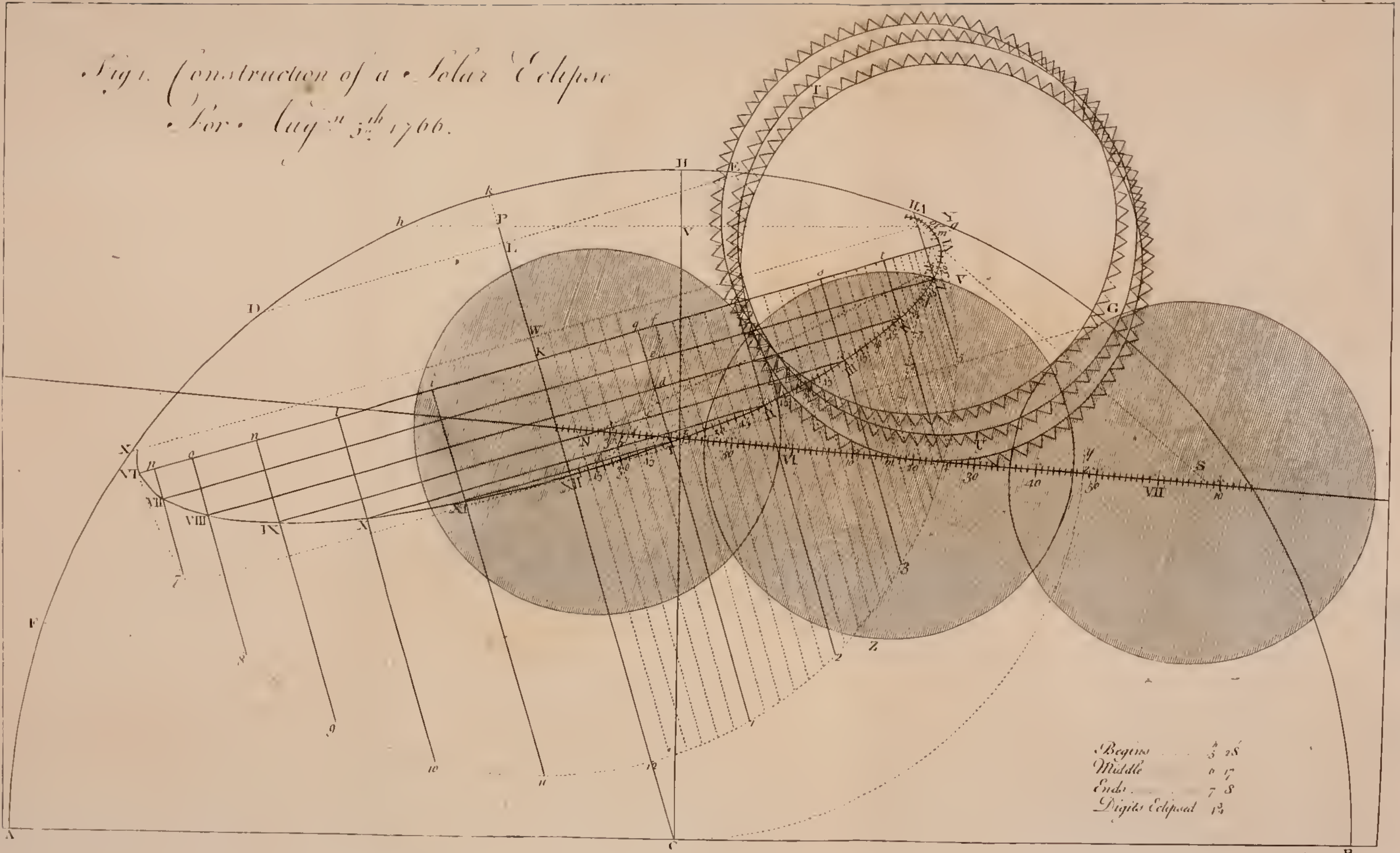


Fig. 1. Construction of a Solar Eclipse
For Augst. 5th. 1766.

Begins	5h. 28′
Middle	6 17
Ends	7 8
Digits Eclipsed	1¾

I. Lodge sculp.

PLATE XLV. Facing Eclipse.

Fig. 1.

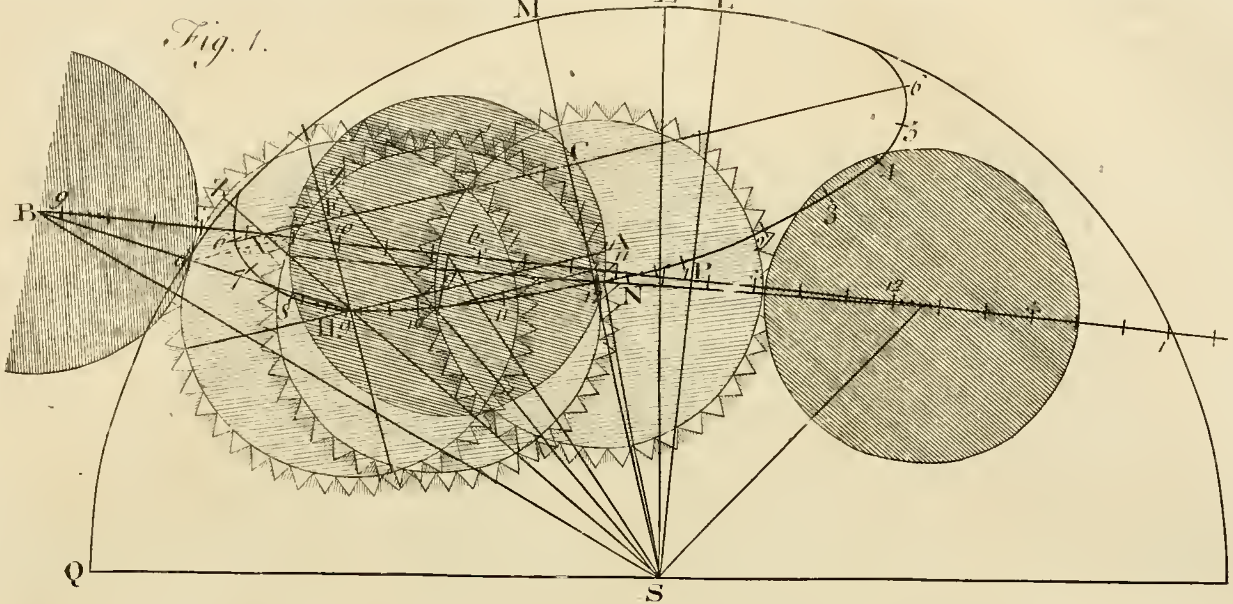


Fig. 2. General Transit.

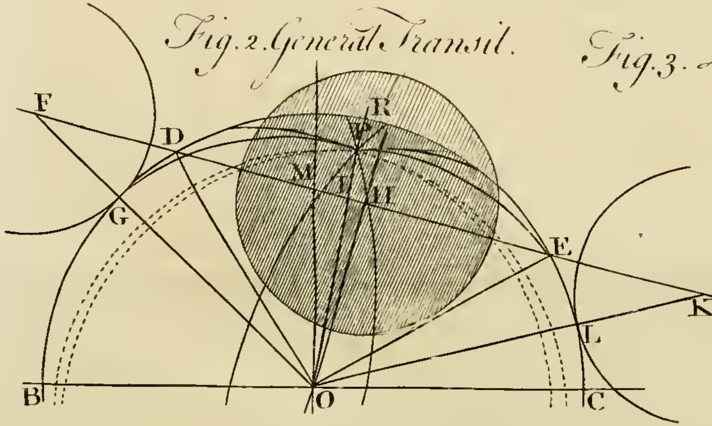
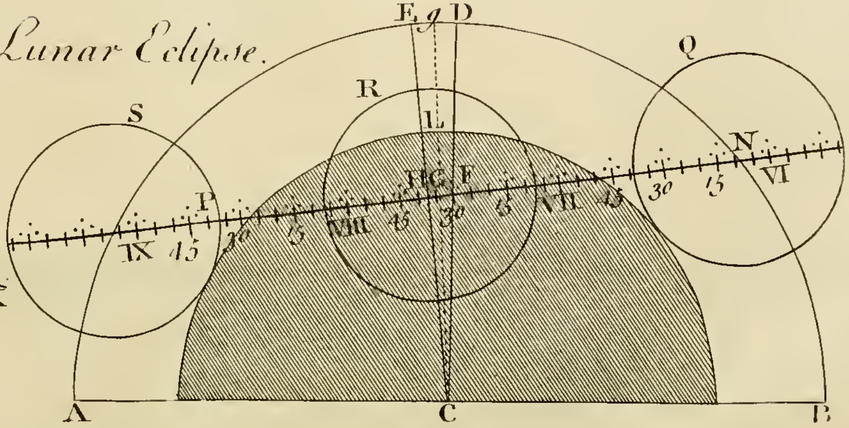


Fig. 3. Lunar Eclipse.



J. Lodge Sculp.

ECLECTICS, *Eclectici*, ancient philoſophers, who, without attaching themſelves to any particular ſect, ſelected whatever appeared to them the beſt and moſt rational.

Potamon of Alexandria was the firſt of the eclectics: he lived in the reigns of Auguſtus and Tiberius; and being tired with the ſcepticiſm of the Pyrrhonians, he reſolved upon a ſcheme that would allow him to believe ſomething, but without being ſo implicit as to ſwallow any entire hypotheſis.

ECLECTOS, the ſame with what is more uſually called linctus. See LINCTUS.

ECLIPSE, in aſtronomy, a privation of the light of ſome luminary, by the interpoſition of an opaque body, either between it and the ſpectator's eye, or between it and the ſun.

Should we enquire into the meaning of the word eclipſe, it will be found a derivative of the Greek verb 'εκλειπω, to ſaint or ſwoon away; for the Grecians ſay, that ſuch perſons as are troubled with a death-like fainting or ſwooning, are eclipſed, or do fall into an eclipſe. Thus, alſo, the moon's body ſeems to vaniſh and grow dark, when deprived of the light of the ſun, by the interpoſition of the earth. But we cannot apply this term ſo properly to the ſun; becauſe the ſun receives its light from no other body; it alone is the great fountain of light and heat; therefore, we may more properly, and ought to ſay, that this phænomenon is an eclipſe of the earth; becauſe it is the earth that is deprived of the light of the ſun by the interpoſition of the moon.

Eclipſes of the luminaries are either ſolar or lunar. The ſolar is cauſed by the interpoſition of the moon, between the ſun and the earth; by which means, ſome particular part of the earth is deprived of the ſun's light for a certain ſpace of time; though other places, at the ſame time, enjoy the full light of that great luminary. But the lunar eclipſe is always univerſal, and appears in all places of the ſame quantity and duration; which is accounted for in this manner: the moon is an opacous body, and has no light but what ſhe receives from the ſun; and therefore cannot be eclipſed, or loſe the light of the ſun, but when ſhe is in her full; when, it is known, ſhe has little or no latitude, and moves diametrically oppoſite to the ſun, and the earth interpoſing itſelf in a direct line, between them, caſts its ſhadow upon the moon, and thereby deprives her of the ſun's light, which may be more or leſs, according to the latitude of the moon.

In ſolar eclipſes it is to be obſerved, that they always begin on the weſt ſide, and end on the eaſt; becauſe the moon, by her proper motion in longitude, from weſt to eaſt, firſt enters upon the weſt limb of the ſun. On the contrary, the lunar eclipſes always begin on the eaſt and end on the weſt ſide; for her motion being from weſt to eaſt, the eaſt part of her body muſt neceſſarily firſt enter the earth's ſhadow.

The ſun is very ſeldom, but the moon is often, totally eclipſed. And the eclipſe of the moon appears from all parts alike, as to quantity and duration; and a reduction for the difference of the meridians, will ſhew the beginning, middle, and end of any ſuch lunar eclipſe for any determinate place on the earth: but this cannot be done in the eclipſe of the ſun; becauſe, at the ſame moment of time, it is leſs in one place than in another; in one part of the earth total, when in another part of the globe they have no eclipſe at all, which is cauſed by the moon's vicinity to the earth, and ſudden changes of her parallax in longitude and latitude, and the ſmall proportion the moon bears to the ſun and earth. To demonſtrate which, let A (*plate* XLIII. *fig.* 2.) repreſent the ſun and center of the world, and let BKRB repreſent the annual orb of the earth, R the body of the earth, SZVS ſhew the orb of the moon; O is the place of the moon, when ſhe is in conjunction with the ſun; VX or Z ſhew the place of the moon when ſhe is in oppoſition; D is the conical point of the earth's ſhadow, which is greater or leſs, according to the diſtance of the earth from the ſun.

By which figure it appears, that the whole body, or the ſun, by the interpoſition of the moon at O, is hidden from the ſight of him that ſtands in the point between R and P: whereas only half the ſun is obſcured to him that ſtands at R; and there is no part of it hidden from him that ſtands at M.

This, I apprehend, may ſuffice to demonſtrate the cauſe of eclipſes of the ſun in particular:

The moon being leſs than the earth, her ſhadow can never cover the whole globe, only a part of it, ſuch as I H; and a total darkneſs happens only to thoſe inhabitants on whom the ſhadow falls. The circumjacent places will be illuminated with ſome of the ſun's beams, called the penumbra, or a lucid partial ſhadow; which will have different degrees of illumination, according to the diſtance from the center of the real ſhadow. The inhabitants where this penumbra falls, will only ſee a part of the ſun's diſk obſcure, which will appear to be more or leſs, in proportion as they are ſituated nearer or farther remote from the center: without this penumbra, all the ſun's body will be ſeen at the ſame time, and no eclipſe perceived at all.

Let S (*fig.* 3.) repreſent the ſun in the equinoctial, and E the earth; then will A be the moon conjoined with the ſun to the ſouth pole, B a true conjunction at the earth's center, or in the equator, and C the moon conjoined with the ſun at the north pole.

Now it is manifeſt, when the moon is at B, her ſhadow falls in the torrid zone; and conſequently muſt take away the ſun's light from that part of the globe; when at the ſame time to the north and ſouth poles only part of the ſun's body will be darkened; and when the moon is centrally conjoined at C, the ſun may be totally eclipſed at the north pole, when at the ſame time to the ſouth part of the world he is free from the leaſt obſcuration. Hence the penumbral cone is determined in this manner:

Let A (*fig.* 4.) repreſent the ſun, E the moon, D the earth, C the moon's opaque ſhadow, and AED a right line joining the three centers; draw the line FG, from the ſuperior limb of the ſun to the earth's ſurface, touching the inferior limb of the moon; and the line H I from the inferior limb of the ſun, touching the ſuperior limb of the moon; and they will interſect each other in the point K; which point will be the vertex, and the line KN the axis of the penumbral cone: about which, if the line KG or KI be made to revolve, it will deſcribe the limits of the penumbra upon the earth's ſurface, and is here repreſented by the faint ſhadow LM.

To know how much of the earth's ſurface can be involved in this penumbra, firſt, let us ſuppoſe the angle of the cone, as demonſtrated by Dr. Keill, in his Aſtronomical Lectures, page 116, without ſenſible error, equal to the apparent diameter of the ſun; then in the triangle KOE, right-angled at O, is given the ſemi-diameter of the moon OE, and the ſemi-angle of the cone OKE, to find the diſtance of the moon's center from the vertex K; which when known, added to the moon's diſtance from the earth, will give the whole height of the ſaid cone from the earth's center: then in the oblique triangle DKI, are given the ſides DK and DI, together with the angle DKI; hence will be found the angle NDI, whoſe meaſure is the arch IN, the ſemi-diameter of the penumbra upon the earth.

After the ſame manner may be found the quantity of the earth involved in the real ſhadow. But if the apparent diameter of the ſun exceed that of the moon, the real ſhadow will not reach the earth: in this caſe there may be a central eclipſe of the ſun, but not a total one: this is called an annular eclipſe; the moon's body appears in the ſun's diſk, ſurrounded by a bright luminous circle. Such an one was obſerved by Clavius at Rome, April 9, 1567; and ſuch another paſſed over the city of Edinburgh, on February 18, 1736-7, in the evening.

As it is evident there can be no eclipſe of the ſun, but when the moon is in the change; for then only the moon is in oppoſition to the ſun, and near the earth's ſhadow: ſo there can be no eclipſe of the moon but at the time of the full. And ſince there is a new and a full moon every month, it will be proper to give a reaſon, why there is not alſo an eclipſe at thoſe times every month. If the moon's orbit lay in the plane of the earth's orbit, that is, if theſe two planes were to coincide in a plane paſſing through the ſun, there would be a total eclipſe of the moon at every full, and conſequently a central eclipſe of the ſun at every change. This is improperly attributed to the ſun, becauſe it is really an eclipſe of the earth; for all the time the ſun retains his own light without the leaſt diminution, and only thoſe inhabitants of the earth that are under the ſhadow of the moon, or of the penumbra, are truly eclipſed.

But the orbs of the earth and moon, being placed obliquely, and not both in the ſame plane, interſect each other in two points, called nodes, where the moon's orbit is found to be inclined to the ecliptic in an angle of about five degrees; therefore the moon may be in ſuch a poſition from the nodes, as to paſs the oppoſition or conjunction, either too high or too low to fall into the earth's ſhadow, or to have her ſhadow or penumbra fall upon the earth. Hence it is very poſſible every full and new moon may not be eclipſed. And it will farther appear, that no eclipſe can happen but when the moon is near one of her nodes; conſequently the quantity of the eclipſe depends upon the diſtance from it: and of both kinds it may be either total, partial, or central.

Let E (*fig.* 5.) repreſent the earth, S, S, S, three different poſitions of the ſun, and M, M, M, M, M, M, various places of the moon in her orbit; let us now ſuppoſe a conjunction or an oppoſition to be made at B or C, at both which places the moon happens to be exactly in the nodes; conſequently, in either of them there will be a central eclipſe. Again, let us imagine the true ſyzigy at D or E; in both thoſe points the moon has conſiderable latitude, and can only produce a partial eclipſe. Farther, if the moon be removed to G or H, there will be no eclipſe at all. Thus, in any part of the moon's orbit, by knowing the moon's diſtance from either node, the limits of eclipſes, both ſolar and lunar, may be eaſily determined; that of the ſun will be found nearly 18°, and that of the moon 12°. Hence it is that eclipſes of the ſun, in general, are more frequent than thoſe of the moon; although in any particular place they are much fewer.

Now from the horizontal parallaxes of the ſun and moon, and their apparent ſemi-diameters, the poſſibility of a ſolar eclipſe is thus determined:

Let A (*fig.* 6.) repreſent the ſun, B the earth, and C the moon; then the angle HEG will be the apparent diameter of the ſun, ſeen from the earth's center; and QER the apparent diameter of the moon, ſeen from the ſame place; and conſequently her ſhadow: hence, LKM will be the penumbral cone, limiting the utmoſt extent of ſuch an eclipſe, and W Z the quantity of the earth's ſurface involved in the real ſhadow at the ſame time. Now to find the apparent diameter of the penumbra in the moon's orbit, we have given the points L and M, upon the earth's ſuperficies; in which, when the moon is at C, the circles XQ and RT will repreſent the ſun's apparent diſk free from obſcuration.

To the inhabitants at L the moon's north limb will juſt touch the ſun's ſouth one, and may here repreſent the beginning of an eclipſe; when, at the ſame time, to the people at M the moon's upper limb will juſt go off the ſun's lower limb, repreſenting to them the end of an eclipſe.

Thus it appears, that the diſtance of the two centers, S and Y, is equal to the apparent diameter of the penumbra; wherefore upon F, with the ſum of the ſemi-diameters of the ſun and moon, equal to the angle F M Y, deſcribe the circle S Y P, and it will repreſent the penumbra in the moon's orb.

It is to be obſerved, if in the above figure C repreſents the moon perpendicular to the equator, and N the north pole, M will be the north limit, and L the ſouth limit of the ſaid eclipſe. Again, to find the apparent diameter of the earth's diſk in the moon's orb, you have given the horizontal parallax of the ſun N D E, and E F N, the horizontal parallax of the moon; draw the line I O parallel to D K E, then will the angles E D N and D N I be equal. Therefore out of the angle F N O, equal to the moon's horizontal parallax, take the angle T N O, that of the ſun, and there will remain the angle E N T equal to the apparent ſemi-diameter of the earth's diſk in the moon's orb. Hence upon the center F, with the difference of the horizontal parallaxes of the ſun and moon E N T, deſcribe X V T, and it will repreſent the ſame.

Now, as was ſaid before, if none of this penumbra fall within the ſaid diſk, there can be no eclipſe: for let E (*fig.* 7.) be the diſk in the ecliptic, and F the penumbra in the moon's orbit, F ☋ is the diſtance of the luminaries from the node: here it is plain that the moon's latitude is greater than the ſum of the ſemi-diameters of the diſk and penumbra, and therefore no eclipſe can happen to that part of the moon's orbit: but if the ſum of the ſemi-diameters of the diſk and penumbra be greater than the moon's true latitude, as at C, than an eclipſe muſt unavoidably happen to ſome place: and if the moon's latitude be leſs than the ſemi-diameter of the diſk, as at B, the eclipſe will be central, and ſomewhere may be total. And further, if all the penumbra fall within the diſk, as at A (*fig.* 7.) the ſame for ſome time may be general. It is to be noted, that in partial eclipſes the center of the penumbra falls without the diſk.

We ſhall next give the method of conſtructing ſolar eclipſes geometrically: but before we can do this, we muſt have the following elements calculated from aſtronomical tables; and as examples are found to convey any thing of this intricate nature in a more familiar manner than precepts alone, we ſhall give a conſtruction of the ſolar eclipſe, which will happen the 5th day of Auguſt next (1766), from tables which have undergone the ſtricteſt examination, and have very ſeldom been known to err a minute from the truth.

1. True time of the ecliptic conjunction, Aug. 1766, apparent time	5^{d} 5^{h} 42′ 12″
2. True place of the ☉ and ☽ at that time ♌	13° 9′ 52″
3. Moon's lat. north	0° 32′ 36″
4. Moon's horizontal parallax	0° 53′ 55″
5. Sun's declination	16° 53′ 17″
6. Sun's true horary motion	2′ 24″
7. Moon's ditto	29′ 25″
8. Sun's ſemi-diameter	15′ 47″,5
9. Moon's ditto	14′ 42″,5
10. Angle of the moon's viſible way	5° 14′ 48″
11. Sun's horizontal parallax	0° 0′ 9″
12. Lat. of Greenwich	51 28′ 39″

1. Take the ſun's parallax from the moon's, gives 53′ 46″, which take from a ſcale of equal parts, ſo large as to give $\frac{1}{6}$ of an inch at leaſt to every minute of parallax, and with this extent, as a radius, deſcribe the ſemi-circle A E B (plate 44, *fig.* 1.) from the center S; which ſemi-circle ſhall repreſent the northern half of the ſun's enlightened diſk.

2. Upon the center C raiſe the ſtraight line CH, perpendicular to the diameter ACB; ſo ACB ſhall be a part of the ecliptic, and CH its axis.

3. Being provided with a good ſector, open it to the radius CA in the line of chords; and taking from thence the chord of 23½ degrees in your compaſſes, ſet it off both ways from H, to *g* and to *h*, in the periphery of the ſemi-diſk; and draw the ſtraight line *g*V*h*, in which the north pole of the diſk will be always found.

4. When the ſun is in Aries, Taurus, Gemini, Cancer, Leo, and Virgo, the north pole of the earth is enlightened by the ſun: but whilſt the ſun is in the other ſix ſigns, the ſouth pole is enlightened, and the north pole is in the dark.

5. And when the ſun is in Capricorn, Aquarius, Piſces, Aries, Taurus, and Gemini, the northern half of the earth's axis C XII P lies to the right hand of the axis of the ecliptic, as ſeen from the ſun; and to the left hand, whilſt the ſun is in the other ſix ſigns, as in this example.

6. Open the ſector, till the radius (or diſtance of the two 90's) of the ſines be equal to the length of V*h*, and take the ſine of the ſun's diſtance from the ſolſtice (43° 9′ 52″) as nearly as you can gueſs, in your compaſſes, from the line of ſines, and ſet off that diſtance of V to P in the line *g* V *h*, becauſe the earth's axis lies to the left hand of the axis of the ecliptic in this caſe, the ſun being in Leo; and draw the ſtraight line C XII P for the earth's axis, of which P is the north pole. If the earth's axis had lain to the right hand from the axis of the ecliptic, the diſtance VP would have been ſet off from V towards *h*.

7. To draw the parallel of latitude of any given

place, as ſuppoſe Greenwich, or the path of that place on the earth's enlightened diſk as ſeen from the ſun, from ſun-riſe till ſun-ſet, take the following method:

Subtract the latitude of Greenwich, $51^{\circ}\frac{1}{2}$ from 90°, and the remainder $38^{\circ}\frac{1}{2}$ will be the co-latitude, which take in your compaſſes from the line of chords, making CA or CB the radius, and ſet it from b (where the earth's axis meets the periphery of the diſk) to X and Y, and draw the occult or dotted line XWY. Then, from the points where this line meets the earth's diſk, ſet off the chord of the ſun's declination $16^{\circ}\ 5'\ 3''$ to D and F, and to E and G, and connect theſe points by the two occult lines F XII G and DLE.

Biſect LK XII in K, and through the point K draw the black line VI K VI; then making CB the radius of a line of ſines on the ſector, take the co-latitude of $38^{\circ}\frac{1}{2}$ from the ſines in your compaſſes, and ſet it both ways from K to VI and VI. Theſe hours will be juſt in the edge of the diſk at the equinoxes, but at no other time in the whole year.

With the extent K VI taken in your compaſſes, ſet one foot in K (in the black line below the occult one) as a center, and with the other foot deſcribe the ſemi-circle VI 7 8 9 10, &c. and divide it into 12 equal parts; then from theſe points of diviſion, draw the occult lines 7 p, 8 o, 9 n, &c. parallel to the earth's axis C XII P.

With the ſmall extent K XII as a radius, deſcribe the quadrantal arc XII f, and divide it into ſix equal parts, as XII a, ab, bc, cd, de, and ef; and through the diviſion-points a, b, c, d, e, draw the lines VII e V, VIII d IV, IX c III, X b II, and XI a I, all parallel to VI K VI, and meeting the former lines 7 p, 8 o, &c. in the points VII VIII IX X XI, V IV III II and I; which points ſhall mark the ſeveral ſituations of Greenwich on the earth's diſk, at theſe hours reſpectively, as ſeen from the ſun; and the elliptic curve VI VII VIII, &c. being drawn through theſe points, ſhall repreſent the parallel of latitude, or path of Greenwich, on the diſk, as ſeen from the ſun, from its riſing to its ſetting.

N.B. If the ſun's declination had been ſouth, the diurnal path of Greenwich would have been on the upper ſide of the line VI K VI, and would have touched the line DLE in L. It is requiſite to divide the horary ſpaces into quarters, and, if poſſible, into minutes alſo.

8. Take the moon's latitude ($32'\ 36''$) from the ſame ſcale the ſemi-diameter of the earth's diſc (C A) was taken from, and lay it down on the line C H from C to x.

9. With the radius C x on x, as a center, deſcribe the arc C y, and making that extent a radius on the line of chords, take therefrom the chord of the complements to the moon's viſible way $= 84^{\circ}\ 45'\ 12''$, and ſet it off from C to z, then through the points x and z draw the indefinite right line N S, which will be the path of the penumbra's center over the earth's diſc, the point x being the neareſt approach of the center of the penumbra to the diſc, and is therefore the ecliptic conjunction of the ſun and moon.

Note. The moon's latitude is now north deſcending; had it been north aſcending, the arc C y muſt have been deſcribed from C towards the left-hand, and the complement to the angle of the moon's viſible way ſet off in the ſame manner. It muſt alſo be remarked, that the inclination of the penumbra's path, with reſpect to the ecliptic A.B, will be the ſame as now, had the moon's latitude been ſouth deſcending, and the contrary way when ſouth aſcending.

10. Take the moon's true horary motion from the ſun, $27'\ 1''$, in your compaſſes, from the ſcale CA (every diviſion of which is a minute of a degree) and with that extent make marks along the path of the penumbra's center, and divide each ſpace, from mark to mark, into 60 equal parts or horary minutes, by dots; and ſet the hours to every 60th minute in ſuch a manner, that the dot ſignifying the inſtant of new moon by the tables, may fall into the point x, half way between the axis of the moon's orbit, and the axis of the ecliptic; and then, the reſt of the dots will ſhew the points on the earth's diſc, where the penumbra's center is at the inſtants denoted by them, in its tranſit over the earth.

11. Direct the points of your compaſſes to the ſame moments of time in the path of Greenwich and in the path of the penumbra, and try them backwards and forwards until you find thoſe which are neareſt to each other, which will be found at $6^{h}\ 17'$; this time muſt evidently be the middle of the eclipſe, or greateſt obſcuration.

12. Take the ſun's ſemi-diameter, $15'\ 47''$, in your compaſſes, from the ſame ſcale from which you laid down C A, (the ſemi-diameter of the diſc) and ſetting one foot in the path of Greenwich at m, namely, at 17 minutes paſt VI, with the other foot deſcribe the circle U T, which ſhall repreſent the ſun's diſc as ſeen from Greenwich at the middle of the eclipſe.—Then take the moon's ſemi-diameter, $14'\ 42''$, in your compaſſes from the ſame ſcale; and ſetting one foot in the path of the penumbra's center, at 17 minutes after VI, with the other foot deſcribe the circle V Z for the moon's diſc, as ſeen from Greenwich, at the middle of the eclipſe, or time of greateſt obſcuration; and the portion of the ſun's diſc which is hid or cut off by the moon's, will ſhew the quantity of the eclipſe at that time; which quantity may be meaſured on a line equal to the ſun's diameter, and divided into twelve equal parts for digits, and here will be found $= 4\frac{3}{4}$ digits nearly.

13. Laſtly, take the ſemi-diameter of the penumbra, $30'\ 30''$ from the ſcale within C A in your compaſſes; and ſetting one foot in the line of the

penumbra's central path, direct the other foot toward the path of Greenwich, and carry that extent backwards and forwards, till both the points of the compaſſes fall into the ſame inſtants in both the paths: and theſe inſtants will denote the time when the eclipſe begins at Greenwich.—The like method will ſhew at what time the eclipſe ends at Greenwich, which will be found at 8 minutes paſt VII.

In this conſtruction it is ſuppoſed, that the angle under which the moon's diſc is ſeen, during the whole time of this eclipſe, continues invariably the ſame; and that the moon's motion is uniform and rectilineal during that time.—But theſe ſuppoſitions do not exactly agree with the truth; and therefore, ſuppoſing the elements given by the tables to be accurate, yet the times and phaſes of the eclipſe, deduced from its conſtruction, will not anſwer exactly to what paſſeth in the heavens; but may be two or three minutes wrong, though done with the greateſt care.—Moreover, the paths of all places of conſiderable latitudes are nearer the center of the earth's diſc, as ſeen from the ſun, than theſe conſtructions make them; becauſe the diſc is projected as if the earth were a perfect ſphere, although it is known to be a ſpheroid. Conſequently, the moon's ſhadow will go farther northward in all places of northern latitude, and farther ſouthward in all places of ſouthern latitude, than it is ſhewn to do in theſe projections.

We ſhall now give a method of computing ſolar or ſtellar eclipſes without parallax.

Let the requiſites for the eclipſe be found and projected as before directed; but it is not neceſſary to project with great accuracy.

Then firſt (in Plate XLV. *fig.* 1.) we hall have SC = SM × ſine of lat. of the place, × by the coſine of the ſun's declination, ÷ by the ſquare of radius; where SM is equal the ſemi-diameter of the diſk, and SC equal the diſtance of the tranſverſe axis of the ellipſe from the center of the projection.

Again, we ſhall have CN equal to SM × by coſine of the latitude × ſine of ſun's declination ÷ by the ſquare of radius where CN is equal the ſemi-conjugate diameter of the ellipſe; and we have CX equal to SM × coſine of the lat. and divided by radius; where CX is equal to the ſemi-tranſverſe axis of the ellipſe.

Let it be required to find the diſtance of the ſun and moon's centers at a given time, before the center of the moon paſſes the point P, ſuppoſe B the place of the moon's center at the given time, and H the place of the vertex or obſerver at the ſame time. Then let fall HE perpendicular to the tranſvers axis of the ellipſe, (deſcribed by the vertex) and HA perpendicular to the conjugate. Then will CE = HA be the ſine of the hour from noon to the radius of the ſemi-tranſverſe axis of the ellipſe; and HE = CA will be the coſine of the ſame hour, to the radius of the ſemi-conjugate axis; whereſore SC and CA being found, SA will be known, and in the right-angled triangle SAH, the two ſides SA and HA being given, the angle ASH, and the ſide SH may be found.

Alſo the angles ESL and MSE being given by the previous calculation, the angle PSH will be given. And in the right-angled triangle PSB, the ſide SP equal the neareſt approach of the centers, which will be given by the calculation; and the ſide PB, which is the time from B, the place of the moon's center to its paſſage over the point P, turned into motion by the horary motion of the moon from the ſun, from whence the angle PSB, and the ſide SB will be found. Then the angles PSH and PSB being known, the angle HSB will be alſo known: and in the triangle HSB, the ſides SH and SB, with the angle HSB between them being given (by the theorem commonly uſed in the calculation of the geocentric places of the planets) we may find the other two angles, and the ſide HB = the diſtance of the centers of the ſun and moon at the given time. And if the diſtance thus found, be equal to the ſemi-diameter of the penumbra, equal the ſum of the ſemi-diameters of the ſun and moon, then that time is the beginning of the eclipſe. But if it be either greater or leſs, we muſt proportion a time by the horary motion of the moon from the ſun to be added to, or ſubtracted from it; and if we repeat the calculation for the time thus found, the beginning and the end of the eclipſe may be found to great accuracy.

The angle ZH*d* = the ſupplement of the angle BHS before found, is equal to the number of degrees from the zenith point of the ſun to the point of the limb that is firſt touched by the moon's limb. The difference of declination of the point *d* where the moon's limb firſt touches the ſun's limb from the center, or limb of the ſun will be known; for let the pricked line *df* be the parallel of declination on the ſun's limb, then the angle ZH*d*, juſt before found, added to the angle ZHU = the angle HSA, found by the foregoing calculation, will be = the angle *d*HU the coſine, of which to the radius of HU = the ſun's ſemi-diameter is equal to H*f*, the declination from the center. And the verſed ſine of the ſame angle to the ſame radius, is equal to EU the declination of the point *d* from the ſun's limb. The ſame may be found at the end or any other phaſis of the eclipſe.

When the line *k b*, perpendicular to the line of the moon's way, cuts the ſame time in the path of the vertex, and in the moon's way, then is the middle of the eclipſe or greateſt obſcuration at that time; and if the angles of the triangle *b*S*b* be found as before directed, then *bb* at the middle of the eclipſe will be a minimum, or the two angles S*b*P and S*b*H will be equal to a right angle, *so* will be equal to the ſemi-diameter of the penumbra — *bb*. And the lucid part *oy* will be equal the difference of the ſemi-diameter of the ſun and moon + *bh*. And the angle which the pricked line connecting the cuſps forms with Z S the vertical line of the ſun's diameter, is equal to the angle B H S — a right angle.

Of the general tranſit of an eclipſe, &c. and how to find the time and particular place of the beginning, &c. of the general eclipſe.

Let B R C N (*fig.* 2.) repreſent the earth's diſk in the ecliptic, B C and F K, &c. the moon's way or paſſage of the penumbra over it, P the north pole. Now the time when the moon's center will be at F D I H M E and R is required. In the firſt place, here is given F O = K O, the ſum of the ſemi-diameters of the diſk and penumbra; ſecondly, D O = O E, the ſemi-diameter of the diſk; and laſtly, M O, the neareſt approach of the luminaries to the center of the diſk, to find F O H and D O H, the two angles of incidence. By the ſolution of a right angled triangle, having found the reduction M H, ſay, As O P or D O is to the radius, ſo is H O to the ſine complement of the angle H O F or D O H: then to find the ſemi-duration F H or H K, the analogy is, As the radius is to F O; ſo is the angle of incidence F O H to F H: or by Eucl. i. 47. $FH = \sqrt{FO^2 - HO^2}$. In like manner may be found D H = H E; which, if divided by the hourly motion of the moon from the ſun, will give each reſpective arch in time; this added to, or ſubtracted from, the time of the greateſt obſcuration, will give the beginning and ending of the general eclipſe, &c.

Now, to find the latitude and longitude of thoſe places upon the earth, over which the center of the penumbra paſſes, O will be that place to which the ſun is vertical; its latitude is always equal to the ſun's declination; and its longitude, from the place to which the tables are accommodated, is equal to the time from noon in that place reduced into degrees and minutes: hence the poſition of the center is known; and conſequently, by the doctrine of ſpherics, the latitude and longitude of any given point, ſuch as G, D, I, H, M, E, or L, may be found. G is the place where the ſhadow firſt touched the earth; D the place where the center firſt comes on, I the point where the ſun is eclipſed in the univerſal meridian; H the place where the center falls; M the nonageſimal degree; E the place where the center goes off from the earth; L the place where the penumbra leaves it.

The mean velocity of the ſhadow over the earth is always equal to the hourly motion of the moon from the ſun in the moon's orbit, reduced into geographical miles.

Lunar ECLIPSES. The beginning, end, and middle of a lunar eclipſe is found much the ſame as has been ſhewn of the ſun's eclipſe. However, hav-collected the previous elements, as mentioned before in the ſolar eclipſe, take the following example of conſtructing a lunar eclipſe.

1. Draw the right line A C B (*fig.* 3.) for part of the ecliptic, and C D perpendicular thereto for the ſouthern part of its axis; ſoppoſing the moon to have ſouth latitude.

2. Add the ſemi-diameters of the moon and earth's ſhadow together, and take this from the ſcale in your compaſſes; and ſetting one foot in the interſection C as a center, with the other foot deſcribe the ſemi-circle A D B, in one point of which the moon's center will be at the beginning of the eclipſe, and in another at the end thereof.

3. Take the ſemi-diameter of the earth's ſhadow in your compaſſes from the ſcale, and ſetting one foot in the center C, with the other foot deſcribe the ſemi-circle K L M for the ſouthern half of the earth's ſhadow, becauſe the moon's latitude is ſouth in this eclipſe.

4. Make C D equal to the radius of the line of chords on the ſector, and ſet off the angle of the moon's viſible path with the ecliptic from D to E, and draw the right line C F E for the ſouthern half of the axis of the moon's orbit, lying to the right hand from the axis of the ecliptic C D, becauſe the moon's latitude is ſouth deſcending.—It would have been the ſame way (on the other ſide of the ecliptic) if her latitude had been north deſcending; but contrary in both caſes, if her latitude had been either north aſcending or ſouth aſcending.

5. Biſect the angle D C E by the right line C *g*; in which line, the true equal time of oppoſition of the ſun and moon falls, as given by the tables.

6. Take the moon's latitude from the ſcale with your compaſſes, and ſet it from C to G, in the line C G *g*; and through the point G, at right angles to C E F; draw the right line P G N for the path of the moon's center.——Then, F ſhall be the point in the earth's ſhadow, where the moon's center is at the middle of the eclipſe; G, the point where her center is at the tabular time of her being full; and H, the point where her center is at the inſtant of her ecliptical oppoſition.

7. Take the moon's horary motion from the ſun in your compaſſes from the ſcale; and with that extent make marks along the line of the moon's path P G N: then divide each ſpace from mark to mark, into 60 equal parts, or horary minutes, and ſet the hours to the proper dots in ſuch a manner, that the dot ſignifying the inſtant of full moon may be in the point G, where the line of the moon's path cuts the line that biſects the angle D C E.

8. Take the moon's ſemi-diameter in your compaſſes from the ſcale, and with that extent as a radius, upon the points N, F, and P, as centers, deſcribe the circle Q for the moon at the beginning of the eclipſe, when ſhe touches the earth's ſhadow at V; the circle R for the moon at the middle of

the eclipſe; and the circle S for the moon at the end of the eclipſe, juſt leaving the earth's ſhadow at W.

The point N denotes the inſtant when the eclipſe begins, the point F the middle of the eclipſe, and the point P the end of the eclipſe.

ECLIPTIC, in aſtronomy, is that circle which the plane of the earth would mark out where it is ſuppoſed to be extended to the heavens.

This therefore is that which the ſun ſeems to deſcribe in his annual courſe.

To explain the generation and nature of the ecliptic, and its diviſions, alſo of the ſecondaries of the ecliptic, and their uſes, and the terms uſed in aſtronomy depending upon them.

1ſt. Suppoſe an obſerver placed upon the earth, by extending his ſight every way equally, if not hindred, bounds the world by a ſpherical ſuperficies concentric with himſelf, (that is, with the earth) and judges all remote objects, whoſe diſtance is unknown, though really very unequally removed from one another, to be placed as it were in the ſame concave ſpherical ſuperficies; as for inſtance, he does the fixed ſtars, ſun, and moon itſelf. This ſphere, concentric to the earth and ſurrounding it, deſigned by the ſight, and beſpangled with the twinkling fixed ſtars, ſupplying the place of an abſolute ſpace, is conſidered at reſt; while we abſtract from the diurnal motion, whereby this entire ſphere or rather the whole heavens, are revolted from eaſt to weſt in the ſame ſpace of twenty-four hours. But ſince by reaſon of the annual motion of the earth about the ſun, the ſun ſeen from the earth ſeems to move forward daily towards the more eaſtern ſtars, the ſun will ſeem to move in this immoveable ſphere or mundane ſpace; and its path marked among the fixed ſtars is called the ecliptic, becauſe the eclipſes of the luminaries happen only in this line; as was ſhewn above.

Having once ſettled the ecliptic, it is evident that as all the orbits of the planets about the ſun, are not in one plane, but each of the planets ſeen from the ſun, makes an excurſion, ſometimes on this ſide, ſometimes on that ſide of the way of the earth, marked among the fixed ſtars; ſo that the planets ſeen from the earth, make an excurſion ſometimes on this ſide, ſometimes on that ſide of the ecliptic, and even in the ſame points of their orbits ſeem to run off variouſly, according to the different ſituation of the earth. But their greateſt excurſion is contained within the boundaries of ten degrees; the aſtronomers therefore have called that tract which the ſun, moon, and planets ſeem to adorn with their motions, and which is a zone or belt, twenty degrees broad, (ten on each ſide of the ecliptic,) by the name of the zodiac, from the images of animals, which the fixed ſtars, in that tract, ſeem to repreſent. The number of the images, pitched upon by them, is twelve; either becauſe this number ſeems the fitteſt, for its being diviſible into parts without a remainder, as two, three, four, ſix, and twelve; or becauſe, while the ſun ſeems to run through the zodiac, in the ſpace of a year, there happen near upon twelve lunations, or the moon runs through all her phaſes twelve times. Theſe parts of the ecliptic and zodiac are called ſigns, and their marks are, Aries ♈, Taurus ♉, Gemini ♊, Cancer ♋, Leo ♌, Virgo ♍, Libra ♎, Scorpio ♏, Sagitarius ♐, Capricornus ♑, Aquarius ♒, piſces ♓. Every one of theſe ſigns is again divided into thirty equal parts, ſo that the whole circle (like all others) is divided into three hundred and ſixty. Though the ecliptic or any other circle has no beginning nor ending, properly ſpeaking; yet aſtronomers begin their reckoning from the firſt point of Aries, which the ſun is ſeen in when the days and nights are equal, and ſpring begins to the inhabitants of the northern hemiſphere, which alſo is the point of the common interſection of the ecliptic and equator. The reckoning is made from ♈ to ♉, ♊, and ſo on, till a return is made to ♈, the beginning again towards the ſame way that the ſun ſeems to move about the earth. And the motion or progreſs this way is ſaid to be *in conſequentia ſignorum*, or according to which the ſun, moon, and almoſt the reſt of the planets ſeem to move: but that phænomenon, which is carried in the contrary order, or from ♉ to ♈, or from ♈ to ♓, is ſaid to be moved contrary to the order of the ſigns, or *in antecedentia*.

Becauſe the axis of the earth after ſeveral revolutions about the ſun, goes a little off from a ſite parallel to that it formerly had, deſcribing the ſuperficies of a cone, the images of the ſtars have removed from the ſigns of the zodiac, to which they originally gave names. And this happens not upon the account of the motion of the ſtars or the ecliptic, but becauſe the equator of the earth is moved together with the axis of the earth, ſo as that the interſections of the celeſtial equator, with the ecliptic, or equinoctial points, (and conſequently all the points of the ecliptic, as they are expreſſible by numbers) remove *in antecedentia*; and the images or the fixed ſtars ſeem to be transferred, in reſpect of them, *in conſequentia*.

If innumerable circles be ſuppoſed to be drawn through the poles of the ecliptic, cutting the ecliptic at right angles, which are called ſecondaries, any point in the heavens may be referred to the ecliptic, by the help of them; that is, any phænomenon is underſtood to be in that point of the zodiac or ecliptic, in which ſuch a ſemi-circle, paſſing through the phænomenon, cuts the ecliptic. And the phænomena that are after this manner referred to the ſame point of the ecliptic, are ſaid to be conjunct, or in conjunction; but ſuch as are referred to the oppoſite points, are in oppoſition. If a quarter of the ecliptic lie between the points to which the appearances are referred, they are ſaid to be in a quartile aſpect, but if a third part of the ecliptic, in a trine aſpect; laſtly, if a ſixth part of the ecliptic lie between them, they are ſaid to have a ſextile aſpect.

Beſides, an arc of the ecliptic intercepted between the beginning of Aries and the ſaid point of interſection, and reckoned according to the order of the ſigns, is called, the longitude of that phænomenon or point, as the arc of a ſecondary, intercepted between the ecliptic and the ſaid phænomenon or point of the heavens, is called its latitude; on which account theſe ſecondary circles are called circles of latitude. The latitude is either northern or ſouthern; for the heavens are divided, according to aſtronomers, by the ecliptic, (a celeſtial circle, becauſe originally conſidered in the heavens) in the northern ſouthern hemiſphere.

The obliquity of the ecliptic is one of the moſt important elements of aſtronomy, becauſe it enters into the calculation of all ſpheric triangles, wherein the ecliptic and equator are concerned.

The obliquity of the ecliptic being equal to the ſun's greateſt declination, namely, when in the tropics; the meridian height of the ſun's centre muſt therefore be obſerved with a good inſtrument on the day of the ſolſtice, and its difference with the height of the equator at the place of obſervation will give the declination of the tropic. Or, more accurately, obſerve the ſun's meridian altitude in each tropic, this will give their diſtance, half of which is the diſtance of each tropic from the equator, that is, the obliquity of the ecliptic.

Example. The true height of the ſun's centre in the winter ſolſtice 1743, was obſerved to be 17° 40 7 ; and in the following ſummer ſolſtice 1744, it was found to be 64° 37′ 17′. Their difference 46° 57 10 gives the ſum of the declinations of the two tropics, half whereof 23° 28 35 is the obliquity of the ecliptic.

The obliquity being known, the relation of all the points of the ecliptic to the equator is determined by a very ſimple operation; that is, the right aſcenſion and declination of theſe points are eaſily found.

Example, Let S be a given point in the ecliptic ♈ C G, diſtant 28° 0′ 0′ from the firſt point of ♈, or C. Draw from the point S the arc S O perpendicular to the equator D C B, which is the declination of thipoin, S and the arc C O of the equator is its right aſcenſion. Now, in the rectangled triangle O S C where the angle S C O is 23° 28′ 35′, and the hypothenuſe C S 28° 0′ 0′, there is found O S = 10° 46′ 44′, and O C = 25° 59′ 55″, for the ſun's right aſcenſion and declination when in ♈ 28° 0′ 0″.

Among the aſtronomical tables, ſome are found which give the right aſcenſion and declination to every degree, and even to every minute of the ecliptic.

It has been a ſubject of controverſy amongſt aſtronomers, whether the obliquity of the ecliptic be variable or not; that is, whether the angle between the planes of the ecliptic and equator, continues always unchangeably the ſame, or is ſubject to alteration: it is alſo diſputed among theſe writers who hold it liable to change, whether that change be regular or irregular. It is certain that the obliquity of the ecliptic is at preſent found to be above a third part of a degree leſs than Ptolemy has given it us. From Ptolemy's time down to Tycho, ſome obſervations have made it leſs, and others more, by a few minutes. They who will have the obliquity to have been always the ſame as it is at preſent, ſurmount all theſe difficulties, by throwing upon the inaccuracy of the obſervations of the ancients, and the imperfection of their inſtruments, all the differences found between them and the moderns: others think this is treating the ancients with too little reſpect; for though it appears by Ptolemy, that they did not pretend to obſerve more nicely than to a ſixth part of a degree, and their inſtruments fell far ſhort of thoſe made uſe of by the moderns; yet it can hardly be imagined, they could be ſo greatly miſtaken in a matter ſo eaſy to be known, and ſo well deſerving their attention. As for thoſe who ſuppoſe that the obliquity is ſubject to a ſort of libration, increaſing in ſome ages, and decreaſing in others, they attribute a greater degree of exactneſs to the obſervations on which they ground this fancy, than they ought. Some have imagined that the obliquity has been always gradually decreaſing, the planes of the ecliptic and equator growing continually nearer to a coincidence. This opinion, beſides its being founded upon a compariſon of ancient and modern obſervations, receives a good deal of ſupport from the conſideration of the figure of the earth.

Now, after proper allowances, the obliquity of the ecliptic comes out from the obſervations of the ancients above a third part of a degree greater than the modern aſtronomers have found it. Louville, after comparing all the ancient obſervations, was of opinion, that the obliquity of the ecliptic decreaſed at the rate of 1′ in a hundred years, and, from a great number of obſervations of his own, about the year 1711, ſet it down 23° 28′ ½, which is ½ a minute leſs than Flamſtead and De la Hire made it: he goes farther, and thinks he diſcovered it to be five ſeconds leſs in the year 1720, than he obſerved it in 1714. But, notwithſtanding the great care with which his obſervations appear to have been made, ſuch a degree of exactneſs, as is here pretended, is hardly credible.

A TABLE of the OBLIQUITY of the ECLIPTIC.

	Authors Names.	Yrs. before Chriſt.	Obliquity.
L.	Pytheas	320	23° 49 23
	Eratoſthenes	230	23 51 20
		After Chriſt.	
	Ptolemy	140	23 48 45
F.	Almamon	832	23 35
	Albatennius	890	23 35
F.	Thebet	911	23 33 30
F.	Abul Wafi and Abu Hamed	999	23 35
F.	Perſian Tables in Chryſococcea	1004	23 35
F.	Albatrunius	1007	23 35
F.	Arzakel	1104	23 33 30
F.	Almeon	1140	23 33 30
F.	Chojah Naſſir Oddin	1290	23 30
F.	Prophatius the Jew	1300	23 32
F.	Ebn Shatir	1363	23 31
	Ulug Beigh	1437	23 30 17
R.	Purbachius and Regiomontanus	1460	23 28
R.	Waltherus	1476	23 30
R.	Wernerus	1510	23 28 30
	Copernicus	1525	23 28 24
R.	Egnatio Danti	1570	23 29
	Prince of Heſſe	1570	23 30
	Tycho Brahe	1584	23 31 30
	Wright	1594	23 30
	Ricciolus	1646	23 30 20
F.	Hevelius	1653	23 30 20
L.	Caſſini	1655	23 29 15
	Richer	1672	23 28 54
	De la Hire	1686	23 29
	Flamſtead	1690	23 29
L	Bianchini	1703	23 28 25
	Roemer	1706	23 28 41
	Louville	1715	23 28 24
	Godin	1730	23 28 20
	Caſſini's Elements d'Aſtronomie	1738	23 28 20
	Dr. Bradley	1766	23 28 8

The letter F. on the ſide of the table intimates the obſervation to be taken from Flamſtead; R. from Ricciolus's Almageſt; L. from Louville; and thoſe without a letter are from the authors themſelves.

The change in the obliquity of the ecliptic, which, very probably, may be cauſed either, 1, by a change in the inclination of the earth's axis, the plane of the earth's orbit continuing immoveable; or, 2, by a change in the plane of the earth's orbit, the axis of the earth continuing parallel to itſelf; or, 3, by a change both in the inclination of the axis and in the ſituation of the earth's orbit. The firſt of theſe ſeems moſt likely to be the caſe; for if we conſider the ſhape of the earth, that it is an oblate ſpheriod, or a globe a little flatted like a turnep, having its diameter at the poles a little ſhorter than at the equator; and that, by reaſon of this figure of the earth, the attraction of the heavenly bodies will act upon it in the ſame manner as if it had a ring round the equator; and that the ſun, being in the plane of the ecliptic, is perpetually pulling this ring, or the protuberant parts about the equator of the earth, towards a coincidence with the plane of the ecliptic; which action of the ſun, together with the like attraction of the moon, is the cauſe of the preceſſion of the equinoxes; and if this be conſidered, it will not appear improbable, that theſe actions of the ſun and moon, which have a continual tendency to bring the plane of the earth's equator nearer to the plane of the ecliptic, ſhould gradually diminiſh the angle betwen theſe planes. The moon indeed, being nearer to the earth, contributes more than the ſun towards this effect, by her attraction; for though ſhe be but twice a month in the ecliptic, yet ſince ſhe is always near it, never deviating much above five degrees from that circle; and theſe deviations are as much towards the north in one half of her period round the earth as they are towards the ſouth in the other; they will ſo balance one another, that the effect of the whole attraction of the moon will be pretty much the ſame, as if ſhe were carried round the earth exactly in the plane of the ecliptic. However, all changes in the poſition of the ecliptic are not to be abſolutely excluded; for, as the planets move round the ſun in different planes, their mutual attraction muſt have a tendency to change the ſituation of all their planes and bring them nearer to a coincidence with one another: but then the diſtance of the planets from each other is ſo great, that the change here mentioned may be ſo exceedingly ſmall as not to become ſenſible in many ages.

ECLOGUE, in poetry, a little elegant compoſition in a ſimple natural ſtyle.

The word is derived from the Greek ἐκλεγω, to ſelect.

The eclogue, in its primary intention, is the ſame thing with the idyllium; but cuſtom has likewiſe made ſome difference between them, and appropriated the name eclogue to pieces wherein ſhepherds are introduced; and idyllium to thoſe written like eclogues, but without any ſhepherds in them.

The eclogue then is properly an image of the paſtoral life; therefore the matter is low, and its genius humble. Its buſineſs is to deſcribe the loves, ſports, piques, jealouſies, intrigues, and other adventures of ſhepherds; ſo that its character muſt be ſimple, the wit eaſy, and the expreſſion familiar. The true character then of the eclogue is ſimplicity and modeſty: its figures are neat, the paſſions tender, the motions eaſy; and though ſometimes it may have little tranſports and deſpairs, yet it never riſes ſo high as to be fierce or violent. Its narrations are ſhort, deſcriptions little, the thoughs ingenuous, the manners innocent, the language pure, the verſe flowing, the expreſſions plain, and all the diſcourſe natural.

The models in this ſort of poetry are Theocritus and Virgil, who both have eclogues of a lofty character: the eclogue, therefore, occaſionally raiſes its voice. Yet M. Fontenelle eſteems it a fault in ſome modern poets to have put matter of high concern in their eclogues, and made their ſhepherds ſing the praiſes of kings and heroes.

Some imagine the name eclogue to have been originally applied to ſuch poems as were written in imitation of others; ſuch are the eclogues of Virgil, which are only imitations of Theocritus.

Eclogue is alſo applied to certain compoſitions in proſe: ſuch are thoſe of Strabo, Diodorus, &c. in which ſenſe the word ſignifies only an extract, or collection.

ECOUTE, in the manege, a pace or motion of a horſe, when he rides well upon the hands and the heels, is compactly put upon his haunches, and hears or liſtens to the heels or ſpurs, and continues duly ballanced between the heels, without throwing to either ſide. This happens when a horſe has a fine ſenſe of the aids of the hand and heel.

ECPHORA, in architecture, commonly ſignifies the diſtance between the extremity of a member or moulding, and the naked part of the column, or any other part it projects from. Some authors, however, account for the ecphora from the axis of the column, and define it to be the right line intercepted between the axis and the outermoſt ſurface of a member or moulding.

ECPHRACTICS, in medicine, remedies which attenuate and remove obſtructions.

ECPIESMA, in ſurgery, a ſort of fracture of the cranium, when the bones are much ſhattered, and, preſſing inwardly, affect the membranes of the brain.

Ecpiesma, in pharmacy, ſignifies the maſs remaining after the juices of vegetables have been preſſed out; and, in this ſenſe, is the ſame as magna. It ſometimes further imports the juice preſſed out.

ECTASIS, in grammar, the ſame with diaſtole. See the article Diastole

ECTHESIS, in church hiſtory, a confeſſion of faith, in the form of an edict, publiſhed in the year 639, by the emperor Heraclius, with a view to pacify the troubles occaſioned by the Eutychian hereſy in the Eaſtern church.

ECTHLIPSIS, εκθλιψις, among Latin grammarians, a figure of proſody, whereby the *m* at the end of a word, when the following word begins with a vowel, is elided, or cut off, together with the vowel preceding it, for the ſake of the meaſure of the verſe: thus they read *mult' ille*, for *multum ille*.

ECTROPIUM, in ſugery, is an inverſion of the eye-lids, when they are ſo retracted that their interior red ſkin becomes prominent, and the eye cannot be ſufficiently covered by them.

The word is derived from the Greek, εκτρεπω, to invert.

ECTYLOTICS, in pharmacy, remedies proper for conſuming calloſities. See the article Callus.

ECTYPE, in antiquity, is an impreſſion of a medal, ſeal, or ring; or a figured copy of an inſcription, or other ancient monument.

The word is derived from the Greek, εκ and τυπος, reſemblance; becauſe it reſembles the original.

ECU, or Escu, a French crown; for the value of which ſee the article Exchange.

ECUSSON, in heraldry, a little eſcutcheon.

EDDISH, or Eadish, the latter paſture or graſs that comes after mowing, or reaping; otherwiſe called eagreſs, earſh, and etch.

EDGINGS, in gardening, a ſeries of plants ſet joining to each other round the edges or borders of flower beds. The principal uſe of edgings is to keep the earth in borders adjoining to gravel walks from being waſhed down in heavy ſhowers, and thereby fouling the gravel; for which purpoſe there is no plant ſo proper as the dwarf Dutch box; though others are made uſe of, as daiſies, thrift, thyme, &c. but as theſe are liable to decay in patches, and require annual or at leaſt biennial replanting, we cannot much recommend them; but for thoſe who are fond of an edging that bears flowers, there are none more agreeable than the double pheaſant-eyed pink, or double daiſy.

EDHELING, *Edhelingus*, the ſame with Atheling. See the article Atheling.

EDICT, *Edictum*, in matters of polity, an order or inſtrument, ſigned and ſealed by a prince, to ſerve as a law to his ſubjects.

EDIFICE, the ſame with building. See Building.

EDILE, or Ædile. See Ædile.

EDITOR, a perſon of learning, who has the care of an impreſſion of any work, particularly that of an ancient author.

EDUCATION is the bringing up and forming the minds of children, either in point of learning or good manners.

The word is formed from the Latin, *educo*, to bring up.

EDULCORATION, in pharmacy, the ſame with dulcifying. See the article Dulcifying.

Edulcoration, in chemiſtry, is the ſweetening or clearing of any matter from impurities, eſpecially the ſalts it may be impregnated with; by waſhing it thoroughly in common water: ſo that it is the ſame with ablution.

The word is derived from the Latin *edulcoro*, to ſweeten, and that from *dulcis*, ſweet.

EHRETIA, in botany, a genus of pentandrious plants, whoſe flower is monopetalous, the tube longer than the cup, and the border cut in five ſegments.

The fruit is an unilocular roundiſh berry, containing four ſeeds, convex on one ſide, and angulated on the other.

EEL, *Anguilla*, in ichthyology, a ſpecies of muræna. See the article Muræna.

Eel-Backed, an appellation given to ſuch horſes as have black liſts along their back.

Eel-Spear, a forked inſtrument with three or four jagged teeth, uſed for catching of eels: that with the four teeth is beſt, which they ſtrike into the mud at the bottom of the river, and if it ſtrike againſt any eels, it never fails to bring them up.

EFFECT is that which reſults from, or is produced by, any cauſe. See Cause.

EFFECTIONS, in geometry, are uſed in the ſame ſenſe with the geometrical conſtruction of propoſitions, and often of problems and practices, which, when they are deducible from, or founded upon, ſome general propoſition, are called the geometrical effections thereunto belonging.

EFFERVESCENCE, in a general ſenſe, ſignifies a ſlight degree of ebullition in liquors expoſed to a due degree of heat. But the chemiſts apply it to that ebullition which is excited when two ſubſtances of different natures, an alcali, for example, and an acid, are mixed together. If the effervеſcence produces a heat in the ſubſtance ſo mixed, it is called a hot effervеſcence; but, if no heat is excited, it is a cold effervеſcence.

EFFICACIOUS, a term uſed by divines, in ſpeaking of grace; importing ſuch grace, as never fails to produce its effect. See Grace.

EFFLORESCENCE, among phyſicians, the ſame with exanthema. See the article Exanthema.

EFFLUENT Fever, the ſame with an inflammatory one. See the article Inflammatory.

EFFLUVIA, minute particles which exhale from bodies.

The word is derived from the Latin *ex*, from, and *fluo*, to flow.

EFFUSION, in a general ſenſe, the pouring out of any thing liquid, and that with ſome violence.

EFT, in zoology, the Engliſh name of the common lizard, *lacertus vulgaris*, called alſo, in ſeveral parts of the kingdom, the newt and ſwift. See the article Lizard.

EGG, *Ovum*, in natural hiſtory, a body formed in certain females, in which is contained an embryo, or fœtus, of the ſame ſpecies, under a cortical ſurface or ſhell.

Egg, in architecture, is an ornament in that form, cut in the echinus or quarter round of the Ionic and Compoſite capitals. The profile or contour of an echinus is enriched with eggs and anchors placed alternately.

Egg-Plant, melongena, in botany. See the article Melongena.

EJACULATOR, a muſcle of the penis, otherwiſe called the elevator.

EJECTA, a term uſed, by lawyers, for a woman deflowered, or caſt from the virtuous.

EJECTION, in the animal œconomy, evacuation, or the diſcharging any thing through ſome of the emunctories, as by ſtool, vomit, &c.

EJECTMENT, *Ejectione Firmæ*, in law, a writ, or action, which lies for the leſſee for years, on his being ejected, or put out of his land before the expiration of his term, either by the leſſor, or a ſtranger. It may alſo be brought by the leſſor againſt the leſſee, for rent in arrears; or holding over his term, &c.

EIGHT, or Piece of Eight. See the article Exchange.

ELABORATORY, the place where chemical proceſſes are performed. See Chemical *Laboratory*.

ELÆAGNUS, oleaſter or wild olive, in botany, a genus of plants whoſe flower is apetalous, the cup is a monophyllous, quadrific, rough, coloured perianthium, with four ſhort filaments, topped with oblong incumbent antheræ. the fruit is an ovate, obtuſe, and ſmooth drupe, including an oblong nut or kernel.

ELÆOSACCHARUM, in pharmacy, a preparation of ſome eſſential oil with ſugar, thus performed: grind an ounce of dry loaf-ſugar to an impalpable powder, in a glaſs mortar, and with a glaſs peſtle, and by degrees add thereto a dram of any eſſential oil, or only half a dram, if the oil be very tenacious; and continue rubbing them together, till all the oil be thoroughly mixed, and drank in by the ſugar. If a little freſh white of an egg be added in the grinding, the oil becomes thereby more eaſily miſcible; but the mixture will not keep ſo long, without turning rancid.

If theſe elæoſaccharums be well prepared, dried, and put into clean glaſſes, exactly cloſed with glaſs ſtoppers, they may be preſerved a long time perfect. By this method, therefore, you may prepare an excellent medicine, rich in virtue: for if the elæoſaccharum of mint be diſſolved in diſtilled mint-water, then ſtrengthened with the addition of ſpirit of mint, and the mixture ſweetened with the ſyrup of the ſame plant, the whole virtues of mint may be thus obtained.

ELAPHOCAMELUS, in zoology, the ſame with the glama, or Peruvian camel. See Glama.

ELASTIC, in natural philoſophy, an appellation given to all bodies endowed with the property of elaſticity.

ELASTICITY, that power or property in natural bodies, by which they reſtore themſelves ſpontaneouſly to the figure and dimenſions which they had loſt by the action of ſome other body applied to them.

Thus a ſpring or bow, when bent, reſtore themſelves, by their elaſticity to the form they obtained before any external force was applied to them. And thus the arteries of an animal body, after being diſtended by the impulſe of the blood, contract and reſtore themſelves, by their elaſticity, to the ſame form and dimenſions they had before they were thus diſtended. Some have endeavoured to ſolve elaſticity by attraction only; as for example, if the ſtring A B (Plate XLVI. *fig.* 1.) be conſidered as made up of particles lying over one another in the manner repreſented at A D B; it is plain that, if the point D be forcibly brought to C, the parts will be pulled from each other; and when the force that ſtretched the ſpring ceaſes to act, the attraction of coheſion, which was hindered before, will take place, and bring back the ſtring to its former length and ſituation, after ſeveral vibrations. Now, though this ſeems to agree pretty well with the phænomena of a ſtring in motion, it will by no means ſolve the elaſticity of a ſpring faſtened to one end, and bent either way at the other, like a knife or ſword-blade. For if ſuch a ſpring be bent from A to *a*, (*fig.* 2.) the particles on the ſide C, which now become convex, will be farther aſunder at F, while the particles at D, carried to the concave part E, will come cloſer together: ſo that the attraction, inſtead of making the ſpring reſtore itſelf, will keep it in the ſituation in which it is, as it happens in bodies that have no elaſticity, where, perhaps, only attraction obtains. Thus a plate of lead, a plate of copper, and a plate of ſoft iron ſtand bent.

But the moſt probable way of ſolving the elaſticity of ſprings, is to conſider both a repulſive, and an attractive property in the particles, after the manner of the black ſand, which is attracted by the load-ſtone, and has been ſhewn by the learned and ingenious profeſſor Petrus Van Muſchenbroeck to be nothing elſe but a great number of little load-ſtones.

The great law of perfectly elaſtic bodies, is, that their relative velocity will remain the ſame before and after colliſion; that is, perfectly elaſtic bodies will recede from one another after the ſtroke, with the ſame velocity that they came together. Many curious phænomena may be explained from this property in bodies.

If the ivory ball A, (*fig.* 3.) weighing two ounces, ſtrike with the velocity 16 againſt B at reſt, weighing alſo two ounces; the body B will move forward after this ſtroke with the velocity 16, A remaining at reſt in its place: the reaſon of this is, that the body A loſes one half of its motion by ſtriking the equal body B, and the other half by the elaſticity of B, recovering its former figure. From this experiment, ſeveral pretty odd phænomena ariſe: thus, if a row of ſhovel-board pieces, that is, metalline cylinders of about half an inch in height, and two inches diameter, be laid upon a ſmooth table, and you take a ſingle piece, and drive it againſt the row, the laſt piece off the row will fly off: for if A (*fig.* 4.) ſtrike the row of pieces B, C, D, E, F, G, H, I, in the direction A *a*, then will the laſt piece I, fly off to *i*, with the ſame velocity that A ſtruck B: and whatever be the velocity of A, no other piece but the laſt piece I, will fly off. But if you take two pieces, as A and B, (*fig.* 5.) and ſtrike them together againſt the row C, D, E, F, G, H, I, the two laſt pieces H and I, will fly off from the other end of the row with the ſame velocity that A and B made the ſtroke.

If three or more pieces are made uſe of to make the ſtroke, the very ſame number will fly off from the other end of the row; and it is to be obſerved, that the ſame will happen with equal elaſtic balls, ſuſpended in a row by ſtrings of the ſame length.

Again, if the elaſtic body A, (*fig.* 6.) weighing four ounces, ſtrike the quieſcent body B, weighing only two ounces, with a velocity equal to 12; then will the velocity of A, after the ſtroke, be 4, and that of B 16. Juſt the reverſe of this happens, when a leſſer body ſtrikes againſt a greater; in which caſe, the ſtriking or leſſer body will be reflected with one fourth of its firſt motion, and the greater be carried forward with a motion which is as 16.

The magnitude and motions of ſpherical bodies perfectly elaſtic, and moving in the ſame right-line, and meeting each other, being given, their motion after reflection may be determined thus: Let the bodies be called A and B, and the reſpective velocities a and b; then, if the bodies tend the ſame way, and A, moving ſwifter than B, follows it, the velocity of the body A, after the reflection, will be $\frac{aA - aB + 2bB}{A + B}$, and that of the body B $= \frac{2aA - bA + bB}{A + B}$; but if the bodies meet, then, changing the ſine of b, the velocity of A will be $\frac{aA - aB - 2bB}{A + B}$, and that of B $= \frac{2aA + bA - bB}{A + B}$: and if either of theſe happen to come out negatives, the motion after the ſtroke tends the contrary way to that of A before it; which is alſo to be underſtood of the motion of the body A in the firſt caſe.

ELATERIUM, in pharmacy, imports in general any purging medicine; but is particularly applied to thoſe which operate with violence; hence the word was transferred to the wild cucumber and the preparations thereof. See MOMORDICA.

ELATERIUM, in botany, a name by which Boerhaave calls the momordica of other botaniſts. See MOMORDICA.

Elasticity.

Fig. 1.

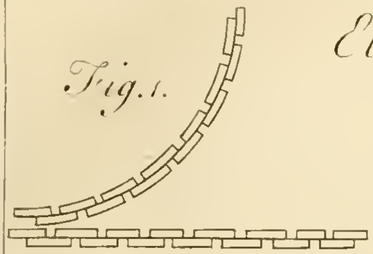
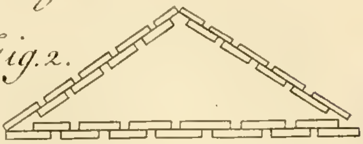
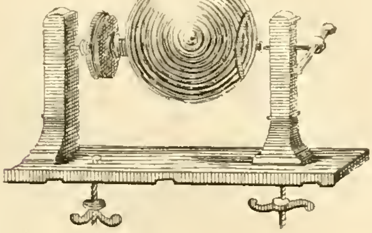


Fig. 2.



Electricity.



Elasticity Fig. 3.

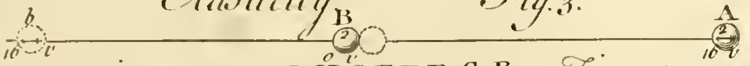


Fig. 4.

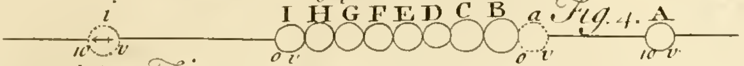


Fig. 5.

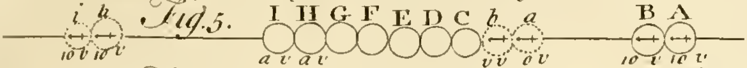
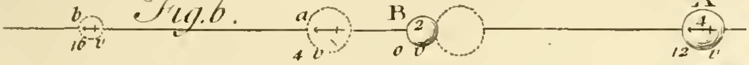


Fig. 6.



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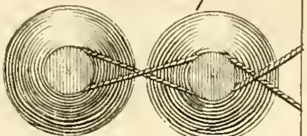

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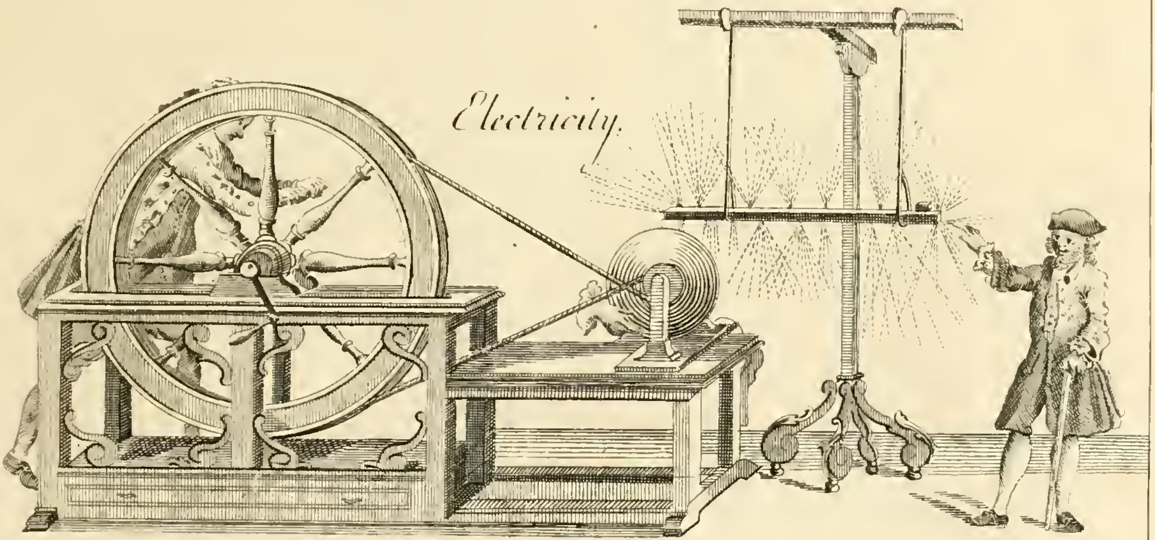

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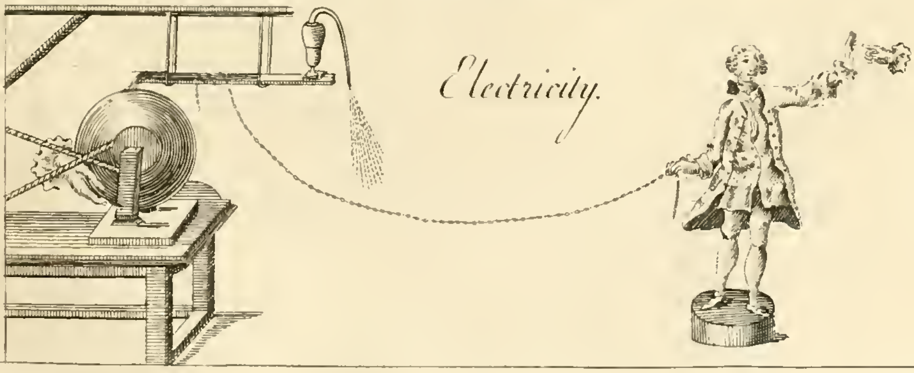


T. Lodge Sculp.

ELATINE Fluellin, in botany, an annual plant which grows naturally among corn in ſeveral parts of England. It hath a white, ſingle, deſcendent, ſlender root, with few fibres. The ſtalk is ſlender, and trails on the ground: this is hairy, and furniſhed with acuminated leaves, which are placed alternately with very ſhort pedicles; at each joint proceeds a ſingle flower of the ringent kind, ending in a tail behind, and in the fore part divided into two lips; the upper one of a yellow colour, and the under one purple. The flowers appear in June and July; and the ſeeds ripen in autumn.

This plant is uſed in medicine, and is accounted a great vulnerary, and good for hæmorrhages of all ſorts. It is alſo ſaid to cure the gout, cancers, leproſy, and king's evil.

ELBOW, in anatomy, the juncture of the cubitus and radius; or the outer angle made by the flexure, or bend of the arm. See Cubitus and Radius.

Elbow, in architecture, a term uſed for an obtuſe angle of a wall, building, road, &c. which divides it from its right-line.

ELCESAITES, in church hiſtory, ancient heretics, who made their appearance in the reign of the emperor Trajan, and took their name from their leader Elceſai.

The Elceſaites kept a mean between the Jews, Chriſtians, and Pagans; they worſhipped but one God, obſerved the Jewiſh ſabbath, circumciſion, and the other ceremonies of the law. They rejected the Pentateuch, and the Prophets; nor had they more reſpect for the writings of the apoſtles, particularly thoſe of St. Paul. They deteſted chaſtity and continence, and obliged their diſciples to marry. They acknowledged a Meſſiah, whom they called their great king; but we do not know whether they meant Jeſus Chriſt, or ſome pretended Meſſiah. They gave him a human form, but inviſible; the dimenſions of which were thirty-eight leagues in height, and ſo in proportion. They pretended that the Holy Ghoſt was a woman, and of the ſame ſize with the Meſſiah. They were much addicted to judicial aſtrology, magic, and enchantments: they held that it was lawful to renounce the faith with the lips, provided a man kept it in his heart.

ELDER, or Seniors, in Jewiſh hiſtory, were perſons the moſt conſiderable for age, experience, and wiſdom.

Elder is alſo a denomination ſtill preſerved in the preſbyterian diſcipline. See the article Presbyterian.

Elder, in botany. See Sambucus.

ELEATICS, a ſect of philoſophers of Elea, founded by Xenophanes, a Colophonian. He held all things to be incomprehenſible, but withal maintained many dogmatical aſſertions. He held that God is one, incorporeal, eternal, all ſight, and all hearing, no way reſembling man: that this God is all things; that whatever is, is eternal; that there are infinite worlds, and thoſe immutable and eternal; that there are four elements; that the ſtars are certain clouds, ſet on fire when they riſe, and extinguiſhed when they ſet; that all comets, falling ſtars, and the like, are clouds, kindled by motion; that the ſun is a fiery cloud, extinguiſhed in its eclipſes; that the moon is a cloſe, compact, and habitable cloud; that there are many ſuns and moons in the ſeveral climates of the earth; that the ſun promotes generation, but the moon contributes nothing to it; that the ſun goes forward infinitum, but to us ſeems to move circularly by reaſon of the great diſtance; that the clouds are a vapour drawn up by the ſun; that the earth was firſt founded and rooted, as it were, in an infinite depth; that the ſoul is a ſpirit; and that all divination is falſe, &c.

ELECAMPANE, in botany, a large plant, with long, wrinkled, oval, acuminated leaves, ſerrated about the edges, pale green above, and hoary underneath, joined cloſe to the ſtalk, which divides towards the top into ſeveral branches, bearing large yellow flowers of the radiated diſcous kind, followed by oblong ſeeds, winged with down: the roots are ſhort and thick, ſomewhat unctuous to the touch, brown, or blackiſh on the outſide, and whitiſh within. It is perennial, grows wild in moiſt rich ſoils, and flowers in June.

The freſh roots of elecampane have a weak, not very grateful ſmell; which, on thoroughly drying, and keeping them for ſome time, is greatly improved, and approaches to that of Florence orris. Chewed, they diſcover at firſt a kind of rancid glutinous taſte, quickly ſucceeded by an aromatic bitterneſs, which by degrees becomes conſiderably pungent.

This root ſtands recommended as a diaphoretic, ſtomachic, for promoting expectoration in humoural aſthmas and coughs, and for attenuating viſcid juices in general, and diſpoſing them to excretion: taken freely, it is ſaid to gently looſen the belly, and increaſe the urinary diſcharge. The doſe of the dry root in ſubſtance is from a ſcruple to a dram or two.

ELECT, *Electi*, among eccleſiaſtical writers, thoſe whom God has choſen, or predeſtinated to be ſaved. See the article Predestination.

ELECTION, the choice that is made of a perſon, or thing, in preference of any other; as, in election of an emperor, of a pope, of a biſhop, of members of parliament, &c.

Election is alſo the ſtate of a perſon who is left to his own free will, to take or do one thing or another, which he pleaſes.

Election, in theology, ſignifies the choice which God, of his good pleaſure, makes of angels and men for the objects of his grace and mercy.

ELECTOR, a perſon who has a right to elect or chooſe another to an office, honour, &c.

Elector is particularly, and by way of eminence, applied to thoſe princes of Germany, in whom lies the right of electing the emperor; being all ſovereign princes, and the principal members of the empire.

ELECTORAL CROWN, or CORONET. See the article CROWN.

ELECTORATE, a term uſed as well to ſignify the dignity of, as the territories belonging to, any of the electors of Germany.

ELECTRICITY, a power or property in ſome bodies; as amber, ſealing-wax, &c. whereby they attract light bodies.

As the power and various phænomena of electricity, which of late have been invented and exhibited in experiments, have greatly amuſed mankind, and juſtly raiſed their wonder and ſurprize, it is but natural to expect they ſhould appear very anxious about the cauſes thereof, or manner of accounting for it; and alſo extremely inquiſitive concerning the uſes that may be made of ſuch an amazing efficacy.

As to the firſt of theſe particulars, viz. the cauſe of electricity, and the manner of accounting for its effects, there have been many hypotheſis formed to ſolve them; but they have been chiefly invented by men, who have appeared to underſtand little or nothing of true philoſophy; or elſe to have been ſo affected with novelty and ſingularity, that the principles they advance are more doubtful and myſterious than the cauſes and properties of the electric virtue they account for by them. We hear people conſtantly debating on this head, as if Sir Iſaac Newton and his philoſophy, had never been head of, or read.

For my own part, I have been always perſuaded we ſhall never arrive at the cauſe of electricity, unleſs we purſue our enquiries by the clue given us by that great man. That is to ſay, the nature, cauſe, properties, and effects of electric virtue, are explicable only on the principles of the Newtonian Doctrine of Light and Fire. This is therefore, in the firſt place, to be premiſed, and which I ſhall lay down under the following heads, *viz.*

Firſt, We find by experience, that the parts of all bodies when agitated to a certain degree, do ſo act upon animal bodies as to excite the ſenſation of warmth or heat.

Secondly, Such an agitation or inteſtine commotion of the parts of bodies may be effected by various means; as friction, percuſſion, fermentation, vital motion, the action of light, *&c.*

Thirdly, The ſtandard degree of warmth or heat, is that of an animal body; or, in other words, if the parts of any body have a greater motion than the parts of the animated body, as the hand, we ſay it is warm or hot; but if they have leſs motion than thoſe of the hand, we ſay they are cold. Laſtly, if the motion of the parts are the ſame in both, we then ſay, ſuch a body is neither hot or cold. And hence it appears, that the ideas of heat and cold are only in a comparative degree.

Fourthly, The parts of bodies when agitated, or heated beyond a certain degree, emit or throw off ſuch fine ſubtle particles, or effluvia, which ſhine or excite the idea of light; and which therefore we generally call particles of light.

Fifthly, When the parts of the body are ſo violently agitated, that they not only throw off lucid particles, but alſo ſhine themſelves, then we ſay, it is a body of fire, when the particles are not in a fuming ſtate; but when they are, we call that lucid fume a flame of fire.

Sixthly, The intenſity of the action of ignited bodies depends as well on the denſity, as the velocity, of the parts; and when both theſe are in an extreme degree, the momentum, or whole force of the heat becomes intolerable, and inconſiſtent with the ſtate of a natural body; and its action is, in this caſe, what we call burning.

Seventhly, There are ſome caſes where the parts may have ſufficient velocity to appear lucid, but not be denſe enough, at the ſame time, to burn.

Eighthly, The motion with which the parts of bodies are thus agitated to emit light, and heat, is of the vibrating kind; becauſe the motions and directions of the particles in this caſe may become uniform, conſonant, and harmonious; and all conſpire to produce the effects which they could not do by a confuſed contrary motion of parts.

On theſe principles Sir Iſaac Newton accounts very clearly for many of the wonderful phænomena of nature, eſpecially of the phoſphoreal and electrical kinds. For inſtance; the ſhining of ſea-water in a raging ſtorm; of quick-ſilver agitated in vacuo; of wood, fleſh, and fiſh, by putrefaction; the ignis fatui; of ſtacks of corn, hay, &c. by fermentation, growing wet, and firing; the glowing of ſome worms, inſects, and eyes of animals, by vital motions; of phoſphorus, by attrition, or the action of the acid particles of air; of iron hammered very nimbly, till it becomes red-hot; of the melted parts of ſteel ſtruck off by a flint; of axle-trees fired by the rapid rotation of the wheels; and of the mixture of ſome ſorts of fluids, producing great heat, accenſion, and exploſion.

But moſt expreſly and largely, he applies this theory to a general explication of the production of electricity. He tells us, the glaſs globe, by attrition with the hand, will ſhine, and emit ſuch an electric vapour, as by ſtriking againſt paper, cloth, or the finger, will be put into ſuch an agitation as to emit light, and make the paper, *&c.* appear lucid, like a glow-worm; and in ruſhing out of the glaſs, it will ſometimes puſh againſt the finger, ſo as to be felt. Thus far Sir Iſaac.

Electricity.

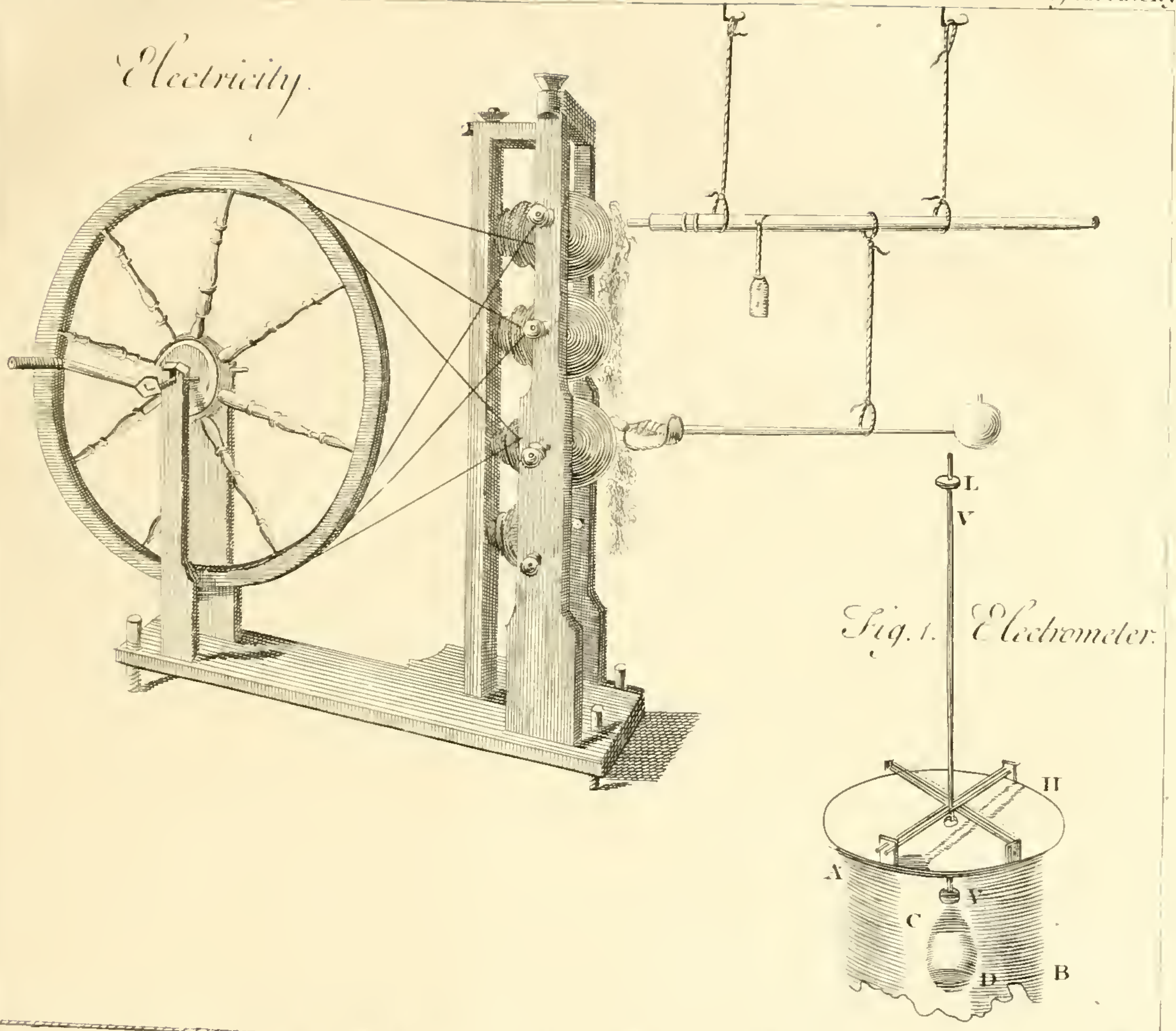


Fig. 1. Electrometer.

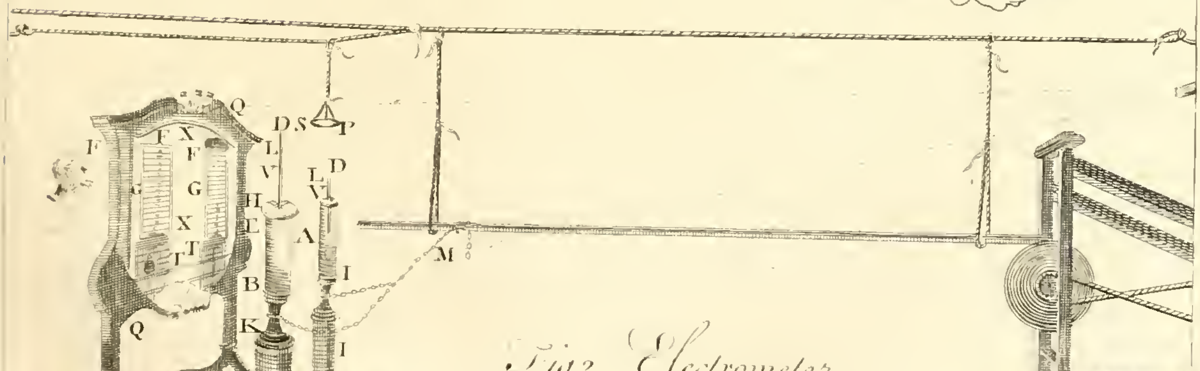


Fig. 2. Electrometer.

J. Lodge Sculp.

The above theory of light and fire will, I think, be nearly ſufficient to ſolve all the phænomena of electricity; which I ſhall enumerate in order as follows.

Phænomena I. The electric virtue conſiſts in a fine ſubtile matter, emitted from ſome ſorts of bodies under the circumſtances of attrition, which bodies are called electrics *per ſe.*

Phænom. II. This virtue will not be excited in ſome ſorts of bodies, which therefore are called non-electrics.

Phænom. III. This virtue repels all light bodies lying on the ſurface of that in which it is excited, which is termed the electrified body.

Phænom. IV. This virtue attracts all ſorts of light ſubſtances within the ſpace of its action, and then repels them again from the electrified body.

Phænom. V. It ſuffers not the body once repelled to approach the electrified body, till it has firſt touched ſome other body, and then it will again attract it.

Phænom. VI. This virtue will run off upon, or be received by all non-electric bodies; but will be refuſed or reſtrained by all electrics *per ſe.*

Phænom. VII. This virtue, when excited to a ſufficient degree, appears lucid, and ſhines in the dark like a flame.

Phænom. VIII. It is emitted with great velocity, attended with a ſnapping; or ſmall, but fierce exploſion.

Phænom. IX. The eruption of electric fire to a non-electric body, condenſes the ſaid fire; and as this fire is in a leſs or greater degree, it appears of a bluiſh purple, yellow, or white colour.

Phænom. X. It runs through any length of a non electric body almoſt inſtantaneouſly.

Phænom. XI. It kindles any inflammable vapours or fume, and thereby ſets the body on fire that emits it.

Phænom. XII. All the properties and effects of the electric virtue appear to be nearly the ſame, at any diſtance from the body in which it was firſt excited, and having paſſed through any number of intermediate non-electric bodies

Theſe are the principal phænomena of electricity, which we now proceed to give ſome account of from the principles of the above-mentioned theory. As to the firſt, there can be no doubt of the exiſtence of ſuch a ſubtile matter in the ſubſtance of bodies, or of its emiſſion or effluvium, becauſe it can be ſo eaſily demonſtrated to the ſenſes by experiments.

This ſubtile matter, or ſpirit, appears to be of an elaſtic nature, and acts by the reciprocations of its tremours, or pulſes, which are occaſioned by the vibrating motion of the parts of an electric body, excited by friction. Hence, as friction is neceſſary to excite a vibrating motion in the parts of bodies, in order to throw off the electric matter; it follows, that thoſe bodies, whoſe parts, by friction, will not conceive a vibration, or put into an uniform reciprocating motion, will not prove electrical, or be productive of electricity: and the defect ſeems to ariſe from the want of a natural elaſticity of the particles of the body. Thus the white of an egg in its natural ſtate, or boiled to a greater conſiſtence, is a non-electric; but when it is thorough dry and hard, it is then as brittle and yellow, and as electrical as amber itſelf.

Nor is it any thing leſs than the higheſt degree of elaſticity in bodies that renders them capable of thoſe vibrations which put the electric matter into action. For we obſerve the white of an egg boiled, and the ſtrongeſt glues, when cold, are conſiderably elaſtic, yet are utterly non-electrical; even tempered ſteel itſelf, though ſo greatly elaſtic, ſhews no ſigns of electricity. In ſhort, nothing leſs than that degree of elaterium, which makes bodies brittle, and break with a poliſh, as in glaſs, amber, roſin, pitch, wax, &c. will conſtitute them electrical.

The electric matter, as it is emitted from the body, enters into, and poſſeſſes every light non-electric body it meets with in its way, and carries it by impulſe in its direction, *viz* from the electric body, this we call the repulſive power of electricity. This electric ſpirit having impregnated the light body, and wholly poſſeſſed it, begins there to form a new ſphere of action, or vibration; whoſe pulſes being in a contrary direction to thoſe of the electrical body, will cauſe the ſaid light body to keep every where beyond the ſphere of its activity, or to be conſtantly repelled by it. This is very evident by experiment.

Hence it is, that when two or more bodies are poſſeſſed of the ſame power, at the ſame time, they always repel each other; ſo the plumulæ of feathers, while the electric virtue is among them, repel each other. Thus it is alſo in magnetics; two needles touched on the ſame pole of a load-ſtone, repel each other, if put together by their touched ends on the ſurface of water, or ſuſpended on the points of needles.

Hence alſo it is, that the electrical virtue will not run off the electrified body to another which is an electric *per ſe*; for though an electric body, in order to emit this virtue very copiouſly, muſt be excited by friction; yet we are to underſtand, that all electrics *per ſe* have naturally a vibrating motion of the parts, by which they emit this virtue in a leſs degree, and imperceptably; and ſo have each a proper ſphere of action; and the pulſes of each ſphere being in contrary directions, cannot conſpire and unite, but muſt reſtrain and cohibit each other. Thus the flame at the end of the iron, at the approach of a match, retires, and ſeems repelled by the contrary action of the brimſtone, while it is greatly dilated at the diſtant approach of the finger, and ruſhes againſt it with a blaſt. Thus alſo it is in magnetics *per ſe*; for two loadſtones placed on the water in baſons, or ſuſpended by ſtrings, with their two ſimilar poles together, will always repel each other. Therefore it is, that when we would conduct or communicate the electric virtue to any great diſtance by the mediation of any non electric body; the ſaid body is either ſuſpended by ſilken ſtrings, which are electrical, or laid on cakes of roſin, that the virtue might not run off thereby.

The electric virtue in that part of its vibration, by which it returns to the excited body in each pulſe, meeting with light bodies in its way, impels them forcibly towards the electric body, and makes them appear to be attracted by that body; and ſo this is called the attractive power of electricity. But here it may be remarked, that electric bodies, if light, as well as others, are attracted; true, they are, but then they are not excited, and their natural vibration, or action, being very weak, will be overcome by the power of the excited and ſtronger electricity, and ſo carried or moved in its direction. It may likewiſe be farther objected againſt what I advanced above, that the natural efficacy of the ſilken ſtrings ſhould be too weak to reſtrain the excited electricity from entering its ſubſtance, and running off by it; but to this I anſwer, in the ſilk there is naturally a ſphere of action or vibration; in the electricity of the electrified body there is none, till it begins to be emitted from the extremity, or ſome other part; all the motion that it has in the electrified body being that which it firſt received from the excited body, and is continued and propagated in the electrified body by the natural vibration of its parts, which is weaker than that in the ſilk, and therefore it muſt paſs on by it, to make its exit at the end.

As to the lucidity of the electric effluvia, nothing more is requiſite thereto, but a certain degree of velocity, which is eaſily produced by attrition, according to article 4th of the Theory.

In order to account for the ſnapping or exploſion of the eruption of the electric fire, it is to be obſerved, that this exploſion, like all others, conſiſts in a violent concuſſion of the air, by a ſudden expanſion and burſting of the denſe ſtream or profluvium of the fire, in ſtriking againſt the non-electric body. Yea, ſometimes it will ſnap againſt, or in the air only, as when it ruſhes out of the mercurial phial through the pores of ſealing-wax. Now this exploſion muſt ariſe from that violent action among the electric particles which proceeds from the extreme degree of velocity that conſtituted a denſe body of liquid fire, (for it never ſnaps but in ſuch a caſe) and by that action, as it becomes more denſe, it becomes elaſtic; and at length, by daſhing againſt the ſurface of any body, it is more and more condenſed, and the innate elaſticity ſo far increaſed, as to cauſe it to burſt, explode, or flaſh away in an inviſible vapour. And perhaps this, more adequately than gunpowder itſelf, repreſents to us the true caſe of lightning and thunder; nor can we here ſuppoſe the effects of ſulphur excluded; for as moſt metalic ſubſtances, ſo iron in particular, contains a great admixture of ſulphur; now ſome of thoſe ſulphureous particles may, by the intenſe action of the electric fire, be diſſolved and carried with it into the air, where the nitro-acid particles may conduce to the accenſion, and promote the exploſion we are ſpeaking of. And hence it may be, that the communication, action, and exploſion, from iron ſubſtances, are much more conſiderable than can be produced from any other.

Where the electric fire is not ſo much condenſed as to ſnap, or explode, it goes off in a large dilated ſtream of purple flame, and greatly reſembles the corruſcations of the aurora borealis, eſpecially that part of the aurora which appears in a conſtant ſtreaming light.

When the electric fire is but a little denſe, it appears of a bluiſh colour, as all other faint lights do; thus the moon-light, which is extremely weak, appears blue in candle-light: and when the ſaid fire is a little more denſe, it appears of a purple hue, and has a greater effect; a ſtill greater denſity makes it look yellow, like candle-light; but the greateſt denſity is ſhewn by a yellowiſh white, like the ſun's light, and then it produces the greateſt force of exploſion and percuſſion. As yellow lightning vaniſhes in an innocent flaſh; but white and denſe lightning produces terrible effects. So alſo phoſphorus, while agitated by a gentle friction, ſpends itſelf in a lambent innoxious blue flame; but when its action is heightened by a greater attrition or contuſion, it kindles into a white flame, and burns with an outrageous and unquenchable fire. Therefore the phænomena and effects of electricity, lightning, and phoſphorus, ſeem to be of a homologous nature, and to have ſomething that is eſſential and common to each.

That the electric fire ſhould ſhew itſelf, and produce its effects at any indefinite diſtance from the excited body, is nothing ſtrange or unaccountable, when we conſider it as a propagated fire, and of a ſimilar nature to lightning; for fire of this ſort loſes nothing, but rather is increaſed by its propagation, with reſpect to its efficacy. As lightning pervades ſoft and yielding ſubſtances unhurt, and proves the diſſolution only of hard and compact bodies, ſo electricity is not felt in the ſoft and muſcular part of the body, but ſtrikes the harder bones with a benumbing ſhock. And as thoſe denſer parts of lightning, which we call thunder-bolts, ſtrike againſt hard bodies, and glance by reflection to different parts, ſo the fire of electricity ſtriking againſt the lower part of the humerus, at the elbow of one arm, ſeems reflected from thence acroſs the breaſt to the elbow of the other arm, and from thence flies out of the body, if nothing be near it; but if ſeveral join hands, it is almoſt inſtantaneouſly reflected from one to the other, through the arms and elbows of the whole company, be they ever ſo many. Laſtly, as lightning does inſtantly deprive an animal of life, by its deliterious ſtroke, when ſufficiently denſe, ſo the electric emanation may be ſo condenſed, and its force ſo encreaſed, as to ſtrike a bird quite ſenſeleſs, and ſometimes quite dead, in a moment. The parallel might be carried yet farther, between lightning and electric fire; but I have not room to enlarge.

Thus I have propoſed what I have to ſay, for a ſolution of the ſeveral phænomena of electricity; for the moſt part of which, I have the authority of an excellent theory, and the ſuffrage of a great many explicit and demonſtrative experiments, which I have ſubjoined for farther ſatisfaction and entertainment of the reader. Theſe experiments are ſuch as I daily ſhew in my courſe of philoſophy, and are therefore, indiſputable facts, and topics of argumentation.

But now I am reduced to the arduous taſk of anſwering this very common and important queſtion: "What is the uſe of this moſt wonderful and ſurpriſing property of bodies?" Not but that my anſwer is very ſhort, and if it were to be but once or twice repeated, would be very eaſy, viz. That at preſent I know ſo little of its uſe, as not to be able to form any rational conjecture about it. What we know of this kind muſt be diſcovered by experience. And as I am fully perſuaded all the powers of natural bodies were deſigned to anſwer very great purpoſes, yet what they are, are not diſcovered to us all at once, but by ſlow degrees. True philoſophy was but dawning a century ago; and can we think it ſtrange that any thing ſhould yet appear abſtruſe or difficult to account for? I rather wonder we have been able, in ſo ſhort a time, to diſcover ſo much relating to the uſes that may be made of it. As for inſtance, the analogy between the fire of electricity and lightning; between its ſnapping and thunder; between their forces and effects on animal bodies, and animal life; between electricity and common fire, in reſpect of velocity and combuſtion; between electricity and phoſphorus, in regard of its various degrees of light, colour of light, and manner of burning. Moreover, we know it has a conſiderable influence on fluid ſubſtances: a glaring inſtance is that of the ſyphon, and ſponge; by which it appears, that fluids in motion, have their motion greatly accelerated by the electric virtue. Thus, if a vein be opened in a perſon electrified, the effluent blood will project to a much greater diſtance, than it would otherwiſe do: and is not this a promiſing indication of ſome great uſe that may be one time or other derived to the animal œconomy from electricity?

Yea, farther, I know from my own experience, that different perſons are affected by the electric virtue in a very different manner; ſome prove extremely electrical, others very little ſuſceptible of it; and it has been found that a perſon poſſeſſed with the infection of the ſmall-pox, could by no means be electrified at all. Theſe are early and intereſting diſcoveries, and plainly intimate this wondrous efficacy was intended for ſomething more than meer amuſement to mankind. What relation it has to the animal ſpirits, or that which we mean by that term, in animal bodies, I know not, but muſt leave to older and wiſer heads to determine by a longer courſe of experiments. What I have ſaid, I ſubmit to the judgment of thoſe whoſe province it is to apply the diſcoveries of natural philoſophy to the utility and benefit of mankind. My buſineſs is chiefly to make the experiments, which I ſhall now proceed to deſcribe in all their proper circumſtances, as they are performed on a machine, conſiſting of a large wheel and glaſs globe, or ſpheroid, fixed in a large long frame of wood, made in moſt reſpects like that of Mr. Monnier, but more eaſy in operation, by means of friction wheels, on which the axle of the great wheel turns; the reſt of the apparatus will be mentioned in the ſequel of the following experiments:

Experiment I. On the axis, in the center of the globe, is fixed a circular ſtring of threads, at ſmall diſtances from each other; and when the globe is at reſt they all hang down by their gravity; but when the globe is put in motion, and a little heated, they all extend themſelves from the center to the circumference, or inner ſurface of the globe, which they very nearly touch, in right-lined directions, ſo as nearly to repreſent the ſpokes of a coach-wheel. This they do by the electric virtue acting ſtrongly upon them from the inner ſurface of the globe. And in this condition they will continue till the virtue ceaſes, and the globe becomes cold, when they gradually fall down, and take their firſt perpendicular directions.

Exp. II. The globe being whirled round, and the threads expanded as before, if the hand or any non-electric body be moved towards the ſurface of the globe, the threads within will ſeem immediately ſenſible thereof; and, as if animated thereby, will, in a very wonderful manner, move every way to the hand, by a motion like that we obſerve in the legs of a ſpider, eſpecially that ſort we call a carter, or father-long-legs. By this experiment we obſerve, the ſurprizing nature and ſubtilty of this kind of effluvia, as it is ſeen to penetrate and pervade the ſubſtance of glaſs with the ſame readineſs and freedom as if nothing were in the way to intercept it.

Exp. III. A hoop of fine threads being placed any how about the globe in motion, will have all the threads drawn out of their natural perpendicular directions into others which paſs through the center of the globe, and ſo will be all perpendicular to the ſurface, which makes a very pleaſing ſpectacle. By this experiment it appears, that the electric virtue acts equally both within-ſide and without the globe, and in directions perpendicular to its ſurface. Hence, alſo, we ſee the power of electricity is greater by far than gravity with us.

Exp. IV. The hoop of threads remaining about the globe in motion, as in the laſt experiment, if the room be darkened, the ends of the threads on the outſide of the globe will be all tipped with fire, and make a beautiful apparition of ſtars: which ſhews, that the electric virtue is a fine thin bluiſh flame of fire, much like that of phoſphorus gently rubbed in the dark. The threads within exhibit no appearance of light; which ſhews, that this virtue acts only outwardly, and by that means the threads within are drawn towards the ſurface.

Exp. V. A long, pointed piece of iron being laid on a frame of ſilken ſtrings, with one end about a quarter of an inch from the globe, will, at the other end, which terminates in a conical point, emit a purple flame of electrical fire, diverging each way from the point, like the rays of the ſun from the focus of a burning glaſs in a darkened room. This pencil of electric rays is viſible even in the day-light, but is extremely ſo in a room made dark; and if the finger be held within a quarter of an inch, it cauſes the fire to iſſue out in a greater quantity, and to appear much more luminous than before.

Exp. VI. The finger being placed as above directed, within a quarter of an inch of the ſaid flame, will be ſenſible of a gentle blaſt of wind from the end of the iron, that is, the electrical fire will iſſue out of the point in ſuch a manner, as to blow againſt the finger very ſenſibly; and if the finger be held ſtill nearer, the large pencil of rays will be condenſed in ſuch a manner as to run out of the point upon the finger in a ſtream, or body, of denſe yellow fire, and ſtrike the finger like a gentle jet d'eau; and, indeed, the phænomenon may be truly called a jet de feu. This electric flame, alſo, is ſenſible to the ſmell, and much reſembles, in that reſpect, the fire of phoſphorus.

Exp. VII. If, while the flame continues to appear from the point of the iron, the finger be placed any where upon the iron, the flame at the end diſappears immediately; if the finger be taken off, it again does inſtantly appear; and ſo by putting the finger off and on ſucceſſively, the electric flame will appear and diſappear alternately. The reaſon whereof is, that when the finger is applied, the electric virtue all runs off upon the finger, as a non-electric body, and therefore cannot go to the pointed end to produce the flame, as it does when the finger is taken off.

Exp. VIII. If a muſket-barrel be ſuſpended, and the finger applied near it, as within $\frac{1}{5}$ of an inch, the fire will forcibly iſſue out, and ſtrike it, and in ſtriking it will give a very ſenſible ſnap; and ſeveral fingers being ſucceſſively applied to the barrel, will cauſe ſeveral ſuch eruptions and ſnappings of the fire, which will be all very ſenſible to the feeling, to the eye, and to the ear; and produce a moſt extraordinary and entertaining phænomenon.

Exp. IX. If a chain, or hempen-cord, be ſuſpended by ſilken ſtrings, all round the room, of any length you pleaſe, and one end thereof be hung by a loop acroſs the barrel, the electrical fire will inſtantly be tranſmitted through the whole length of the chain, and appear upon every part at the approach of the finger, and be heard to ſnap, and ſtrike with as great, if not greater, force, than from the gun-barrel itſelf. In this particular, the electric fire ſeems ſomewhat a-kin to that of lightning.

Exp. X. If a feather be ſuſpended by an hempen or flaxen thread, or ſtring, it will, when held near the barrel, be ſtrongly attracted thereby, and adhere immoveably thereto; becauſe all the electricity goes away, or runs off through the non-electric bodies, with which the ſaid feather communicates. But the manner how the feather can be attracted by a virtue or power acting outwardly, and in contrary directions may ſeem ſomewhat ſtrange, yet it is accounted for by the foregoing theory.

Exp. XI. The ſame feather, or any light body, ſuſpended near the gun-barrel by a ſilken ſtring, will be firſt attracted by it, and then ſoon afterwards repelled; and will continue to be ſo repelled till it has touched ſome other body. The reaſon of this is, that upon the contract with the barrel, the feather is impregnated with the electric virtue, which will not run off upon the ſilken ſtring, as being an electric *per ſe*. Now, it is found to be the caſe of all attracting powers, that bodies equally poſſeſſed with them always repel each other, unleſs they are either in immediate contact, or very near it. But when the feather has touched ſome non-electric body, it loſes its electricity, and again becomes capable of being attracted.

Exp. XII. If the ſilken ſtring by which the feather is ſuſpended be wetted throughout its length, it will become a non-electric body; and the feather, inſtead of being attracted and repelled, will now be only attracted. For all the electric virtue runs off by the moiſture of the thread: by which it appears, that water, or any kind of moiſture, is a non electric ſubſtance, and ſo a conductor of electricity. Hence it is, that in a moiſt air, the feather in its repelled ſtate will, by degrees, loſe all its electricity among the aqueous particles, and will then again return to the electrified barrel, by attraction.

Exp. XIII. In like manner, a card, or tin-plate, being fitted into the end of the barrel, if any light bodies be laid thereon, as leaf-gold, ſilver, or braſs, &c. they are immediately repelled, as if blown away with a blaſt of wind; nor will they come near the barrel or plate again, till they have firſt diſcharged their electricity on ſome non-electric bodies.—

Note, While the globe is whirling round, ſome perſon ſtanding by muſt lay his finger over the barrel, to prevent the electric virtue going to the light bodies till the appointed moment; when, upon taking off the finger, they all fly off at once.

Exp. XIV. If under the ſaid plate you hold another, with the ſame light bodies upon it, they will be attracted and repelled alternately between the two plates, in a very entertaining manner, and with a very great velocity, and for a conſiderable time. The reaſon why they are attracted a ſecond, third, &c. time, is becauſe each time they are repelled back to the lower plate, they loſe upon it all their virtue and ſo become again attractible.

Exp. XV. If a large plumy feather be ſuſpended horizontally at the end of a long chain, communicating with the barrel, and another ſet upright under it, on a cork, in a glaſs phial upon a pedeſtal; then when the finger (before laid on) is taken off the barrel, it is very pleaſant to ſee how the electricity coming among the plumulæ, or fibres of the ſuſpended feather, will cauſe them to extend and expand themſelves every way from the rib of the feather, at the ſame time they will attract the feather beneath, and cauſe its fibres to raiſe themſelves, and briſtle out in the ſame manner. Here it is obſervable, that all the plumulæ repel each other, and therefore ſtand at an equal diſtance nearly; and this they do, as being all poſſeſſed of the ſame virtue, which cannot go off, becauſe of the glaſs phial, which is an electric *per ſe*.

Exp. XVI. While the feathers are in their repellent ſtate, if any one lays his finger on the barrel, or any part of the chain, it is beautiful to ſee how how inſtantly the feathers are ſenſible of it, by letting their plumage all fall and drop into their natural ſtate. As alſo if he but ſlightly touches the barrel, or chain, the feathers ſuddenly catch, and ſhrink in, like the ſenſitive plant; and hence, by the way, ſome think the phænomena of that plant are owing to the repulſive power of electricity between the finger and its leaves.

Exp. XVII. If, while the feathers are electrified, a perſon approaches his finger near them, (eſpecially that which is ſuſpended) they will immediately point all their plumulæ towards the finger, and be ſtrongly attracted by it; and if the finger touches the feathers, they all ſeem eager to embrace it, and are ſtrongly attached thereto; if the hand be moved round about the ſuſpended feather, the feather will nimbly turn after it, and every where endeavour to lay hold on it; which, when it does, it loſes all its electricity, and again becomes non-electric.

Exp. XVIII. If to a gun-barrel you adapt a ſmall tin cup, and pour in water, then a perſon holding his finger perpendicular over the water, and within a quarter of an inch of its ſurface, or leſs, will find the water riſe up in form of a cone to meet his finger, and from the vertex or top thereof, a little ſtream of fire will iſſue to the finger, and ſnap againſt it as uſual, though not with ſo much force as from the ſides of the pot or the barrel itſelf. It is obſervable, that neither the water nor any other body will be in the leaſt ſenſibly heated by all the electric fire they are capable of receiving. Whence it appears, that this fire is not ſufficient to put the ſmall particles of bodies into ſuch a vibration or agitation, as to excite the leaſt ſenſation of warmth or heat.

Exp. XIX. If a ſponge, thorough dry, be hung on to the electrified barrel, it gives no appearance of fire, which ſhews it to be an electric ſubſtance: but if when the ſponge has been immerſed in water, it be ſuſpended to the barrel as before, and the finger or hand be applied near to it, the fire iſſues out with conſiderable force and ſnapping, and the drops which before the ſponge was electrified fell very ſlowly, will now fall very faſt; if the room be darkened, theſe drops will appear to be drops of fire, and illuminate the baſon into which they fall.

Exp. XX. If a capillary ſyphon be hung on to the ſmall cup of water above-mentioned, at the end of the barrel, and the finger laid acroſs the barrel to prevent the electric virtue going to the water; then before the water is electrified, you obſerve the ſyphon to drop only, and that very gently; but when the finger is taken off, and the water becomes electrified, the ſyphon runs a ſtream; and if the room be dark, it iſſues from the ſyphon in appearance of fire.

Exp. XXI. A perſon ſtanding on a cake of roſin, with his hand laid on the gun-barrel, if a vein be opened in his arm, then (if the electricity be ſtopped by the finger, as above) the blood will fly out to a certain diſtance; but when the finger is taken off, and the perſon by that means electrified, the blood will receive an impetus therefrom, and ſpin out with a much greater velocity, and to a much greater diſtance than before.

Exp. XXII. If a phial of water be provided, and well corked, and a wire bent on the top be pierced through the cork, and thruſt down near the bottom of the phial, leaving the upper part ſtanding about two or three inches above the bottle, then laying this wire on the globe in motion, the wire will receive the electricity from the globe, and the water will be impregnated therewith, the more as the wire is kept longer on the globe; then the perſon thus holding the phial in one hand, is to approach a finger of his other hand near the middle part of the globe, and he will receive the electric eruption of fire with a very conſiderable ſnap and force, greater by much than what proceeds from the barrel alone; the reaſon is, becauſe all the electricity running through the wire into the water, is there condenſed as it were, and confined by the electric ſubſtance of glaſs, and ſo acts in a greater quantity, and therefore with a greater force, than when it iſſues from the barrel unconfined.

Exp. XXIII. In order to make this condenſation of the electric fire yet greater, the cork and top of the phial is to be cloſed every way very nicely with ſealing-wax; and then applied to the globe, as before, when the phial of water has been fully ſaturated with electricity, the ſurplus will immediately iſſue out in wonderful ſtreams of purple fire, through ſeveral pores it finds in the cork and wax; and very often many of theſe ſtreams will make a beautiful appearance in the room when darkened, and is a moſt ſingular phænomenon in nature.

Exp. XXIV. If inſtead of water we fill the phial with quickſilver, the ſnap and force will be ſomewhat greater, but nothing near in proportion as mercury is denſer than water; ſo that the force of electric percuſſion does not appear to depend upon the quantity of matter in the percutient phial, for if it did, the phial of mercury muſt give fourteen times a greater ſtroke (*cæteris paribus*) than the ſame ſized phial of water, which it does not do, and therefore ſome other principle of action ſeems latent in the ſubſtance of bodies.

Exp. XXV. While the phial of mercury is electrifying on the globe, the electric ſtreams will iſſue out of the ſealing-wax more copiouſly than from the phial of water, and will of themſelves ſnap; and theſe flaſhings and ſnappings ſucceed each other ſometimes very faſt, and repreſent, as it were in miniature, an artificial thundering and lightening; and their phænomenon is peculiar to the mercurial phial, the phial of water never ſnapping of itſelf that I have yet obſerved.

Exp. XXVI. If either the phial of water or mercury, when electrified on the globe, be hung on the gun-barrel, the hand ſtill holding it faſt, then a finger of the other hand applied near the barrel, will draw off a ſpark that will give a very ſenſible ſnap and ſtroke, which will be felt in one or both the arms, and alſo acroſs the breaſt; and it is very remarkable, that this ſenſation is rather an uneaſy than a painful one, and goes no farther than the elbows, in general.

Exp. XXVII. If the electrical virtue be ſufficiently condenſed in the phial, by holding the wire long on the globe, then the room being made dark, and the phial held up with the hand, the electric fire will be ſeen to go off from the point of the wire in a ſmall white flame, which will continue ſome time; and if a finger be applied near it, the wire will emit it with a ſnap, but not ſo forcibly as when held on the globe. And this is the only way, perhaps, of retaining the electric fire, or making its action temporary. And the letter from Paris ſays, it has been thus retained in the froſt for thirty-ſix hours together. But I cannot produce any permanency of its efficacy like that.

Exp. XXVIII. A perſon ſtanding on a cake of roſin, at leaſt three inches thick, laying one hand on the gun-barrel, will be electrified, that is, he will be all over poſſeſſed with the electric virtue, and at the ſame time feel nothing of it, unleſs ſome perſon ſtanding by put his finger near to any part, and then the virtue will be emitted in form of fire from any part, and ſnap, and become very ſenſible to both the parties, but in a very innocent manner.

Exp. XXIX. If the perſon electrified holds in his hand a ſword, or any pointed poliſhed piece of iron, and the room be darkened, a continual flame iſſues out of the point every way, like that deſcribed in Exp. V. and VI.

Exp. XXX. If the electrified perſon holds a ſmall cup of water in one hand as he ſtands on the roſin, and with the other takes hold of the wire in the electrified phial, and then the perſon who holds the phial, by approaching his finger near the ſurface of the water, will cauſe it to emit the fire with a more ſenſible ſnap and force, than can be excited without it.

Exp. XXXI. If the perſon ſtanding on the roſin holds a piece of money between his teeth, and the wire of the electrified phial with one hand; then if the perſon who holds the phial touches the money, the ſhock will be very ſenſibly felt in the teeth and head of the electrified perſon who holds it, and alſo to the other who touches it.

Exp. XXXII. Let a perſon ſtand on one cake of roſin, and lay one hand on the barrel; and let another perſon ſtand on another cake by him, and then when the firſt perſon is thoroughly electrified, let them both incline their heads and ſalute each other, and the fire will join their lips when nearly touching, and give them a ſmart and mutual rebuff, which will make them ſeparate more haſtily than they joined: but yet the pungency is not ſo great as to be very diſagreeable.

Exp. XXXIII. A wire fixed on a pedeſtal, and placed upright in a baſon of water, is to be electrified from the phial above-mentioned, and then the perſon holding the phial is to touch the ſurface of the water in the baſon with the other hand; the fire here has a conſiderable effect, but not ſo great as the letter from Paris ſeems to intimate at, leaſt I could never find it ſo.

Exp. XXXIV. The phial being electrified, as above, the whole company join hands, or communicate with each other by wires, then the operator, or perſon who ſtands firſt, at one extremity of the line, hangs the electrified phial on the barrel, when the perſon at the other extremity draws off the ſpark from the barrel; and at that inſtant all the company receive the ſhock, which they feel to their elbows, and in both their arms. But I could never yet find thoſe ſhocks ſo violent and dangerous as they have been repreſented, though they are nearly as great as any perſon (eſpecially the men) care to endure. This experiment will equally ſucceed, be the company ever ſo large.

Exp. XXXV. A perſon ſtanding on roſin, with one hand on the barrel, points the finger of the other to the warm ſpirits of wine, and by communicating the electric fire thereto, kindles the riſing fume, and ſo ſets the whole on fire. In this manner, any ſort of matter, which, when warmed, will ſend forth an inflammable vapour, may be thus ſet on fire.

Exp. XXXVI. Another way to ſet fire to the ſpirit is this; the perſon holds the phial of mercury, or water, when electrified, on the barrel with one hand, and the warm ſpirit being put into a cup or ſpoon adapted to the barrel, and thereby ſtrongly electrified, a finger of the other hand being held over and near the ſpirit, draws the electric ſpark out of it, and with a ſnap ſets the vapour in a flame, and conſequently all the ſpirit.

Exp. XXXVII. Becauſe gunpowder, when heated, emits no inflammable ſtream, it cannot be fired by itſelf; but if you mix with it a little inflammable vegetable oil of any ſort, and grind them together, and then put a ſmall quantity into a ſpoon and heat it, the vapour will be fired in each of the two ways above-mentioned for firing the ſpirit, and will ſet fire to the oil and powder nearly at the ſame time, and the powder will be exploded in the ſame manner it uſually is when wetted. But it may be fired dry, by mixing it with camphor, and reducing both to a powder, for this will ſend forth an inflammable vapour, which will be kindled when heated, in either of the methods above deſcribed.

Exp. XXXVIII. If a plate of tin be adapted to the end of the barrel, and another be held about two inches under it with a ſquare or long piece of leaf gold, braſs, &c. then while the barrel is electrified, the ſaid piece of gold will be ſwiftly at firſt attracted and repelled between the two plates, till at laſt the action between each becoming equal, the leaf gold will be ſo equally affected by either, that all its variable motion will be deſtroyed, and it will appear to be ſuſpended at reſt between both, and afford a moſt ſurpriſing and agreeable ſpectacle.

Exp. XXXIX. If a ſmall bell of a clock be fixed to the end of the gun-barrel, and another at four inches diſtance on a pedeſtal of wood at the ſame height, and then a ſmall ivory ball be ſuſpended by ſilken ſtrings in the middle between both; the barrel when electrified will electriſy the firſt bell, and that will attract the ivory ball; as it hangs by ſilk, which is itſelf electrical, it will retain all the electric virtue it receives from the bell, and therefore will be repelled from it, and thus be made to ſtrike againſt the other bell; on this it will diſcharge all its electricity by contact, and ſo become again a non-electric, and in that caſe will be again attracted by the firſt bell. And this effect will be produced alternately, ſo long as the globe is in motion; the conſequence of which is, that the ivory ball will be put into conſtant vibration, and make an electrical pendulum, which, as it ſtrikes each bell, it makes them ring, and produce one of the moſt agreeable effects both to the eye and ear.

Exp. XL. If a ſmall plate be held under that adapted to the gun-barrel, and light bodies laid upon it, and then a fine piece of muſlin or lawn be interpoſed between both; the electrified barrel will not affect the light bodies, but they will remain abſolutely at reſt. For the electric virtue will run off upon the muſlin, and its ſupporter, as being non-electric bodies; and ſo will not come near the light bodies to put them in motion.

Exp. XLI. If a loadſtone, armed with iron, be hung on to the gun-barrel by an iron wire, the electric virtue will ruſh out from every part, but more forcibly from the iron than from the ſtone itſelf; from the ſtone it ſeems to be emitted in a more lax manner, and diffuſed in a ſort of ſteam or fiery vapour; whereas from the iron it iſſues in a more impetuous, denſe, and penetrating ſtream. By this experiment we ſee the two moſt conſiderable powers of nature, electricity and magnetiſm, do no way interfere, or impede each other's action.

Exp. XLII. If the globe be exhauſted of all its air, and then whirled about on the machine, the electricity will be obſerved to act wholly within the globe, where it will appear (in a darkened room) in form of a cloud or flame of reddiſh or purple coloured light, filling the whole capacity of the globe. This voluble flame will be diminiſhed, and diſappear by degrees as the air is gradually admitted into the globe. The reaſon why the action of the electric virtue does not ſhew itſelf outwardly, is the ſtrong repulſive power of the electric particles of air encompaſſing the globe, confining the electric effluvium, and cauſing it to tend inwards, where it meets with no reſiſtance in the vacuous ſphere.

In plates XLVI. and XLVII. there is given a view of ſeveral electrical machines, which have been invented by different perſons who have been curious in trying electrical experiments.

ELECTROMETER, an inſtrument contrived to meaſure the force of electricity.

This inſtrument was contrived about the year 1748 by M. Le Roy and M. D'Arcy, and is made in the following manner.

In Plate XLVII. *fig.* 1. A B is a large veſſel containing a glaſs bottle C D, called the philoſophical egg: at the extremity of the neck of this bottle is fitted on the root V, perfectly cylindrical, one line in diameter, and twelve inches long. The veſſel A B is covered again at the top with a plate of braſs H, which fits cloſe upon it; this plate has a large perforation at its center, and ſo has the veſſel, that the rod may paſs through at liberty. At the upper extremity of the rod, is the ſmall circular plate of braſs L, fourteen lines $\frac{1}{6}$ diameter. The veſſel A B being full of water, the egg is immerſed to a certain depth, which ought to be ſuch that, the inſtrument being at reſt, that is, not electrified, the lower extremity of the egg may be, as near as poſſible, to the bottom of the veſſel without touching it. That the egg and rod may always be in a vertical ſituation, the egg is ballaſted with mercury, by which means the center of gravity being very low, the whole keeps itſelf perpendicular to the horizon, and proves by the leaſt poſſible motion of the egg, from its balance, that, if it were not confined, it would go towards the ſide of the veſſels, and ſwim ſometimes on one ſide, and ſometimes on the other; wherefore it was neceſſary to determine it to a center, in the following manner: on the plate H are fixed five ſilver wires in the form of a croſs, like thoſe in micrometers; this croſs is formed by double wires which have a ſmall ſquare ſpace in the center of the plate, which, being larger than the diameter of the rod, permits it to aſcend and deſcend between the wires without any ſenſible friction, and yet reſtrains it from erring from its center: and this ſingular phænomenon ariſes, when the whole machine is ſtrongly electrified; the rod keeps in the middle of the wires, and almoſt without touching them, becauſe, being electrified, as well as they are, it avoids them continually.

After this deſcription of the inſtrument, it is eaſy to conceive its uſe, eſpecially if we attend to this known principle in hydroſtatics, that a body immerſed in water ſwims on the ſurface, or ſinks in it, in proportion as a volume of water, like that it poſſeſſes, is lighter or heavier than the body itſelf; from this principle it follows, that a volume of water equal to that of the egg, and that part of the rod immerſed in the water, when the whole is at reſt, was equal to the egg, the little plate, and all the rod: conſequently, if the whole be elevated one inch, the power which will ſuſtain it at this height, will ſuſtain a weight equal to a volume of water of the thickneſs of the rod and an inch above; becauſe the volume of water which the egg and rod then poſſeſſes is leſſened by this quantity. If, therefore, different powers ſuſpend it at 1, 2, 3, 4 inches, *&c.* in height above the point of reſt, theſe powers will be, with regard to each other, as theſe numbers, double, trible, quadruple, *&c.* you will ſee, in a moment, that electricity produces the ſame effect upon the electrometer, that is, it performs the function of a power which would ſuſpend it at 1, 2, 3, 4 inches, *&c.* above its point of reſt, and conſequently, that by means of this inſtrument, we may eſtimate all its different degrees of force; let us ſuppoſe, for example, the whole machine compoſed of the veſſel A B, the egg, *&c.* placed like that in O, (*fig.* 2.) on a recipient of glaſs, or any other electric *per ſe*. Electrify the veſſel A B, the rod V and plate L will become electrified alſo. Now, it is admitted, that all electrical bodies repel each other; thus the little plate L and the rod V, being repelled by the great plate H, will neceſſarily riſe more or leſs in proportion to the ſtrength or weakneſs of the electricity. Electricity therefore will, as I have ſaid before, perform the function of a power, that will ſuſpend the inſtrument to a certain elevation; but, as theſe powers are proportional to the elevations of the inſtrument above its equilibrium, or point of reſt, theſe elevations alſo will be in proportion to the different degrees of the force of electricity: this is therefore a true electrometer. But this inſtrument is of much more extenſive uſe than barely this; for it may be employed in a great number of electrical experiments, to determine the laws of attraction, repulſion, tranſmiſſion, *&c.* in electrical bodies; diſcoveries equally important with that of menſurating the electrical force.

Method of uſing the electrometer.—As electrical bodies have this inconvenience, that they cannot be approached, without deſtroying their electricity, it is evident, that, if we come ſo near the electrometer as to judge of its motions with exactneſs, we ſhould deſtroy its electricity. This reaſon determined us, after a number of attempts, to make our obſervations in the following manner: we placed a great lantern, with a large wax candle, in a part of the room, which projects its light through a hole on the electrometers I K (we have not drawn the lantern in the plate, for fear it might have cauſed ſome confuſion, and have, therefore, only exhibited the ſtream of light); behind theſe electrometers is a very ſolid frame Q; all the part X is wood, but it may be of any opake matter. In this frame are cut two rectangles, or windows, filled with glaſſes, on which are marked very exact diviſions in ſtrong Indian ink.

This frame is ſo diſpoſed, that the projection of the electrometers may fall upon the glaſſes, and the extremity of the rod D, being made in the form of a cone, projects a very nice ſhadow. Now, as theſe glaſſes are tranſparent, the obſerver, placed behind in F, ſees, in the moſt diſtinct manner, all the different elevations of the electrometer, and can therefore judge of all its variations with the utmoſt exactneſs; for, the plane of the ſquare being perpendicular to the horizon, and the electrometer riſing and falling in a parallel plane, the elevations and depreſſions of the ſhadows are always correſpondent to thoſe of the electrometers. The chains M ſerve to conduct the electricity from the bar of iron, or any other electrified body, to the electrometer; the ſquare Q, inſtead of two windows, may have but one, that being ſufficient for the electrometer. But we muſt, at the ſame time, make our obſervations on the inſtrument with which we made the experiments, and the electrometer too, to be aſſured that the electricity is always equal; which cannot be done without comparing their ſhadows very cloſely. The conſtruction of the electrometer ſhews it has all the eſſentials to an inſtrument of this kind.

1ſt, As the electrical force is very weak, the inſtrument muſt be very nice, and ſenſible of the leaſt impreſſion; therefore the weight of eight grains, laid on the little plate, makes it ſink above four inches.

2dly, As the electrical force is very ſubject to alterations, the inſtrument muſt be ſo contrived as to exhibit all its variations; a thouſand experiments have convinced us, that the leaſt alteration in the force of electricity immediately affects the electrometer. It is, in ſhort, univerſal, for the true electrometer is the cylindrical rod V, which determines the quantity of electrical power by the number of its parts raiſed above the point of reſt. Now it is not difficult to procure a cylindrical rod of a line diameter. It is true, the diameter of the little plate L, and its diſtance to H, the point of reſt, may cauſe ſome differences in the repulſions; but it is eaſy to obſerve all theſe proportions; ſo that any one may conſtruct an electrometer, which will be operated upon, like ours, by the ſame power of electricity. This property ſeems, to me, one of the moſt remarkable in our inſtrument, like that of M. Reaumer's thermometer, which all Europe has admired. As I have ſaid our electrometer might be uſed as an inſtrument, it may be proper to give ſome account of the experiments we have made. In order to diſcover whether electricity is in proportion to the bulk or ſurface of bodies, we applied ourſelves in the manner following: The inſtrument E ſerved for an electrometer, the other, I, was deſigned to make the experiment on. Above this laſt was ſuſpended perpendicularly, at the diſtance of ten inches, a cap or portion of the ſphere PS; this cap was of hammered iron, very thin and of a very regular figure; it received its electricity from the electrical bar by a braſs wire, and, being ſuſpended on ſilk, preſerved it. The chain in *fig.* 2, which has a communication with both inſtruments; in this experiment but with the electrometer; ſo that the inſtrument was not electrified. One perſon made his obſervation on the ſquare of the height of the electrometer cauſed by the electricity; another obſerved the elevation of the inſtrument; and ſeveral repeated experiments confirmed us in the opinion, that the elevation of the inſtrument was in proportion to the force of the electricity; and this we found to anſwer exactly, after having repeated the experiment above fifty times. We afterwards poured mercury into this cap, till it increaſed the weight ſixty-fold, and found no ſenſible alteration in the experiment. This ſeems to ſhew, that the attraction of electrical bodies is in proportion to their ſurfaces; but this is a matter of doubt, for the fire and ſparks drawn from an electrical body may follow ſome other law. Certain it is, that a piece of any metal muſt be of a certain thickneſs to extract ſhining ſparks from it, otherwiſe you can only procure ſuch a kind of fire as is extracted from electrified wood of any thickneſs; yet, if we extract ſparks from the middle of a plate of iron, they are very ſtrong, and thoſe extracted from the cap, whether with or without mercury, ſeemed to have no difference. We have, in ſhort, found, by a multitude of experiments, that the ponderoſity or lightneſs of a body neither increaſes nor diminiſhes its electricity.

ELECTRUM, amber, in natural hiſtory. See the article AMBER.

ELECTUARY, in pharmacy, a form in which both officinal and extemporaneous medicines are frequently made. It may be conſidered as a number of boluſes united together, but made a little ſofter by the addition of a due proportion of ſyrups, &c.

ELEGANCE, or ELEGANCY, an ornament of politeneſs and agreeableneſs, ſhewn in any diſcourſe, with ſuch a choice of rich and happy expreſſions, as to riſe politely above the common manners, ſo as to ſtrike people of a delicate taſte, and diffuſe a reliſh which affects every body.

It is obſerved that elegance, though irregular, is preferable to regularity without elegance: that is, by being too ſcrupulous of grammatical conſtruction, we loſe certain licenſes wherein the elegance of language conſiſts.

ELEGANCE, in painting, a certain manner which embelliſhes and heightens objects, either as to their form, colour, or both, without deſtroying or perverting the truth. It is not ſeen in the correctneſs of the deſign, as appears from Raphael, and the antique. It is moſt ſenſibly perceived in works otherwiſe careleſs and inaccurate, as in Corregio, where, notwithſtanding all the defects as to juſtneſs of deſign, there is an elegance even in the manner of the deſign itſelf, as well as in the turn of the attitudes, &c.

ELEGIT, in law, a writ of execution, which lies for a perſon who has recovered debt or damages; or upon a recognizance in any court, againſt a defendant that is not able to ſatisfy the ſame in his goods.

ELEGY, in poetry, primarily and generally implies a mournful poem.

The word is derived, according to Didymus, from ε, a particle of grief, and λεγω, to ſay, and according to others from ελεον, ſomething moving, and λεγω.

As elegy, at its firſt inſtitution, was intended for tears, it expreſſed no other ſentiments, it breathed no other accents, but thoſe of ſorrow. With the negligence natural to affliction, it ſought leſs to pleaſe than to move. By degrees, however, elegy degenerated from its original intention, and was employed upon all ſorts of ſubjects, gay or ſad, and eſpecially upon love.

Ovid's books of love, the poems of Tibullus and

Propertius, are intitled elegies; and yet ſo far are they from being ſad, that they are ſometimes ſcarce ſerious: ſo that one and the ſame title was indiſcriminately given to poems on different ſubjects, but which agreed in their verſe and manner of writing. The chief ſubject then to which elegy owes its riſe, are death and love: ſo that elegy ought to be eſteemed the moſt perfect, which has ſomewhat of both at once; namely, where the poet bewails the loſs of ſome youth, or damſel, falling a martyr to love. The next are thoſe elegies full of that melancholy complaint which lovers ſeldom want matter for: the thoughts of elegy ſhould be always natural, far from the affectation of wit: its ſentiments tender and delicate; its expreſſion ſimple and eaſy, always retaining that alternate inequality of meaſure which Ovid extols ſo much; and which gives the elegiac poetry of the ancients ſo much the advantage over the moderns. Elegy ſhould flow in one even current, ſmooth, humble, and unaffected; and yet ſhe is not abject in her humility, but becoming, elegant, and attractive.

Some early writers in this way, among the Greeks, were Callimachus, Philetas, Mimnermus, Callinus, and others, of whoſe writings only fragments have been ſaved. Quintilian gives the preference to Callimachus; but Horace ranks Mimnermus above him. Mimnermus is by ſome reckoned the inventor of elegiac verſe; he at leaſt gave it its perfection, and was perhaps the firſt who transferred it from funerals to love.

Among the Latins, Ovid, Tibullus, and Propertius, bear the firſt rank: there is ſcarce any thing of Catullus's elegiac, except the meaſure of ſome of his verſes; and thoſe ſo rough, that they cannot be read without great offence to the ear. Ovid is generally reckoned the firſt among the elegiac writers; yet Tibullus is leſs diffuſe and more correct. Ovid's perpetual repetition of *mei*, *tui*, and *ſui*, in the laſt foot of his pentameters, is unpardonable. Tibullus and Propertius rarely fall into this fault, but into another, eſpecially the latter, from which Ovid is free; and that is, concluding the pentameter with words of three or four ſyllables; whereas harmony requires a word of no more than two.

Among the ancients, hexameters and pentameters were ſo peculiar to elegy, that this kind of metre is uſually ſtyled elegiac. Inſtead of it, we, in our tongue, uſe the word heroic.

Among our modern poems, we have only ſome elegies on funeral occaſions; but we have many that may be called ſo in the larger ſenſe of the word, as uſed by the ancients; many very ingenious ones on love; and others of a melancholy and ſoft turn.

ELEMENT, in phyſiology, a term uſed by philoſophers to denote the original component parts of bodies, or thoſe into which they are ultimately reſolvable.

The elements of Ariſtotle were four, earth, water, air, and fire. See ARISTOTELIAN *Philoſophy*.

The Carteſians admit only three elements, the firſt a materia ſubtilis, or fine duſt; the ſecond, a courſer, but round kind; and the third, a ſtill more irregular and hooked kind of particles. See the article CARTESIAN *Philoſophy*.

Concerning the true elements of nature, the incomparable Sir Iſaac Newton thus explains himſelf in his optics: "It ſeems probable to me, that God in the beginning formed matter in ſolid, maſſy, hard, impenetrable, moveable particles, of ſuch ſigns and figures, and with ſuch other properties, and in ſuch proportion to ſpace, as moſt conduced to the end for which he formed them; and that theſe particles, being ſolid, are incomparably harder than any porous bodies compounded of them; even ſo very hard, as never to wear or break in pieces, no ordinary power being able to divide what God himſelf made one in the firſt creation. While the particles continue entire, they may compoſe bodies of one and the ſame nature and texture in all ages: but, ſhould they wear away, or break in pieces, the nature of things depending on them would be changed. Water and earth compoſed of old worn particles, and fragments of particles, would not be of the ſame nature and texture, now, with water and earth compoſed of entire particles in the beginning: and therefore, that nature may be laſting, the changes of corporeal things are to be placed only in the various ſeparations and new aſſociations and motions of theſe permanent particles; compounded bodies being apt to break, not in the midſt of ſolid particles, but where thoſe particles are laid together, and only touch in a few points."

The chemical elements or principles to which all bodies may be ultimately reduced, are theſe five: 1. Water, or phlegm, which, in the chemical analyſis of them, riſes firſt in form of vapour. 2. Air, which eſcapes unſeen in great quantities from all bodies, ſo as to conſtitute half the ſubſtance of ſome of them. 3. Oil, which riſes after, and appears ſwimming on, the ſurface of the water. 4. Salt, which is either volatile, or riſes in the ſtill, as that of animal ſubſtances; or fixed, as that of vegetables, which is obtained by reducing them to aſhes, making a lixivium or ley of theſe, and afterwards evaporating the moiſture; by which means the common ſalt ſhoots into cryſtals. 5. Earth, or what is called *caput mortuum*, being what remains of the aſhes after the ſalt is extracted. This is the laſt element of all bodies, which can be no farther altered by any art whatſoever. See WATER, AIR, &c.

ELEMENT, in a figurative ſenſe, is uſed for the principles and foundations of any art or ſcience, as Euclid's Elements, &c.

ELEMI, or ELEMY, is a reſin of Aſiatic origin: the plant which produces it is not yet known with certainty. There is alſo an inferior kind, brought from America, which is the only one now to be met with in the ſhops: the parent of this ſort is called by Ray, *Arbor Brazilienſis gummi elemi ſimile fundens, &c.* a Brazilian tree, yielding a gum like elemi, with winged leaves, verticillate flowers, and a fruit about the ſize and ſhape of an olive.

The true elemi comes over in large oblong maſſes or round leaves, generally wrapt up in leaves of the Indian reed. It is of a yellowiſh or rather greeniſh white colour, ſemitranſparent; of a ſoft conſiſtence, betwixt that of wax and turpentine, or dry on the outſide and ſoftiſh within: by age, it grows hard and brittle throughout. It has a moderately ſtrong, not unpleaſant ſmell, reſembling that of a mixture of fennel, daucus, and ſmallage-ſeeds. It is commonly full of impurities, which are obvious enough to the eye.

This reſin has hitherto been employed only in external applications; in nervine, vulnerary, and digeſtive plaſters and balſams. In making theſe kinds of compoſitions, we muſt be careful to avoid too great a degree of heat in mixing the ingredients; leſt the eſſential oil, the moſt uſeful part of the elemi, be loſt.

ELENCHUS, in logic, a ſophiſm, or fallacious argument, which deceives the hearer under the appearance of truth. See the article SOPHISM.

ELEOSACCHARUM, or ELÆOSACCHARUM. See the article ELÆOSACCHARUM.

ELEPHANT, *Elephas*, in zoology, a genus of quadrupeds, of the order of the jumenta, the characters of which, according to Linnæus, are theſe: it has no fore-teeth, the upper canine, or dog teeth, are conſiderable long, it has a very long flexible proboſcis or trunk, and two paps placed on the breaſt.

The teeth of this animal is what we call ivory. See IVORY.

The elephant, of which there is only one known ſpecies, is, when full grown, from ſeventeen to twenty feet high; and its body is withal ſo enormouſly bulky, that the belly reaches nearer the ground than could eaſily be conceived of a creature of its height. The trunk is, properly ſpeaking, nothing but the noſe continued to a great length; its ſubſtance is fleſhy, but firm, being compoſed of three ſeries or orders of fibres: this trunk the creature can contract or protrude forward with great violence, from the length of one foot to five or more.

Knights of the ELEPHANT, an order of knighthood in Denmark, conferred upon none but perſons of the firſt quality and merit. It is alſo called the order of St. Mary. Its inſtitution is ſaid to have been owing to a gentleman among the Daniſh croiſees having killed an elephant, in an expedition againſt the Saracens, in 1184, in memory of which king Canutus inſtituted this order, the badge of which is a towered elephant, with an image of the Holy Virgin encircled with rays, and hung on a watered ſky-coloured ribbon, like the George in England.

ELEPHANTIASIS, or ELEPHAS, in medicine, is a ſpecies of leproſy, ſo called, becauſe it effects the legs in ſuch a manner, as to make them appear like thoſe of an elephant. See LEPROSY.

The word is derived from the Greek, ελεφας, an elephant.

ELEPHANTOPUS, in botony, a genus of plants, whoſe flower is compound and tubuloſe, and conſiſts of four or five hermaphrodite ligulated corollulæ, each having a narrow border divided into five parts; the ſtamina are five very ſhort capillary filaments, top'd with tubuloſe cylindrical atheræ; the ſeeds are ſolitary, and contained in the cup of a compreſſed figure, and crowned with briſtly hairs.

ELEVATION, *Elevatio*, the ſame with altitude or height. See ALTITUDE.

Angle of ELEVATION, in gunnery, that comprehended between the horizon and the line of direction of a canon or mortar; or it is that which the chaſe of a piece, or the axis of its hollow cylender, makes with the plane of the horizon.

ELEVATION, in architecture, the ſame with an orthographic, or upright draught of a building. See ORTHOGRAPHY.

ELEVATION *of the Hoſt*, in the church of Rome, that part of the maſs where the prieſt raiſes the hoſt above his head for the people to adore.

ELEVATOR, in anatomy, the name of ſeveral muſcles, ſo called from their ſerving to raiſe the parts of the body to which they belong; ſuch are the elevator alæ naſæ, the elevator of the auricle or external ear, the elevator of the epiglotis, of the eye-lids, humerus, lips, urethra, and thoſe of the anus, called alſo levatores. See MUSCLE.

The elevator of the eye-lids is alſo called ſuperbus, as being uſed when people put on a haughty high look.

ELEVATOR, in ſurgery, an inſtrument to elevate or raiſe bones, as in fractures of the ſkull, &c.

ELEVE, a French term, ſometimes met with in the Engliſh language, ſignifying a diſciple or ſcholar.

ELEUSINIA, in Grecian antiquity, a feſtival kept in honour of Ceres, every fourth, by ſome ſtates, but by others, every fifth year. The Athenians celebrated it at Eleuſis, a town of Attica, whence the name.

ELEUTHERIA, another feſtival celebrated at Platæa, by delegates from almoſt all the cities of Greece, in honour of Jupiter Eleutherius, or the aſſertor of liberty.

ELIQUATION, in metallurgy, a ſeparation of the different parts of mixed bodies, by the different degrees of fire required to melt them.

ELIRE, or CONGE D'ELIRE. See the article CONGE.

ELISIUM, or ELYSIUM. See ELYSIUM.

ELISION, in grammar, the cutting off or ſuppreſſing a vowel at the end of a word, for the ſake of ſound, or meaſure, the next word beginning with a vowel.

Eliſions are pretty frequently met with in Engliſh poetry, but more frequently in Latin, French, &c. They chiefly conſiſt in ſuppreſſions of the *a*, *e*, and *i*, though an eliſion ſuppreſſes any of the other vowels: in the following example from Virgil there are three eliſions.

Phillida amo ante alias. ——

ELIXATION, in pharmacy, the extracting the virtues of ingredients by boiling or ſtewing. See Decoction.

ELIXIR, a compound tincture extracted from many efficacious ingredients. Hence the difference between a tincture and an elixir ſeems to conſiſt in this, that a tincture is drawn from the ingredients, ſometimes, with an addition of another to open it, and diſpoſe it to yield to the menſtruum; whereas an elixir is a tincture extracted from ſeveral ingredients at the ſame time.

The word is Arabic, *al-ecſir*, or *al-ekſir*, and implies an artificial extraction of ſome eſſence.

ELK, *Alce*, in zoology, an animal of the deer-kind, with the horns palmated, and without a ſtem. It is a native of the northern parts of Europe; and is a very large and ſtrong animal, being equal in ſize to a horſe, but much leſs beautiful.

Elks hoofs ſtand recommended for the cure of the epilepſy; but at preſent are only uſed as an ingredient in ſome old compoſitions.

ELL, *Ulna*, a meaſure of length different in different countries; but thoſe moſtly uſed in England, are the Engliſh and Flemiſh ells: the former of which is three feet nine inches, or one yard and a quarter, and the latter only twenty-ſeven inches, or three quarters of a yard. In Scotland, the ell contains $37\frac{2}{10}$ Engliſh inches. See the article Measure.

ELLIPSIS, in geometry, a curve line returning into itſelf, and produced from the ſection of a cone by a plane cutting both its ſides, but not parallel to the baſe. See Conic Sections.

The eaſieſt way of deſcribing this curve, in plano, when the tranſverſe and conjugate axes A B, E D, (Plate XLVIII. *fig.* 1.) are given, is thus: Firſt take the points F, *f*, in the tranſverſe axis A B, ſo that the diſtances, C F, C *f*, from the center C, be each equal to $\sqrt{AC - CD}$; or, that the lines F D, *f* D, be equal to A C. Then, having fixed two pins in the points F, *f*, which are called the foci of the ellipſis, take a thread equal in length to the tranſverſe axis A B; and faſtening its two ends, one to the pin F, and the other to *f*, with another pin M ſtretch the thread tight: then if this pin M be moved round till it returns to the place from whence it firſt ſet out, keeping the thread always extended ſo as to form the triangle F M *f*, it will deſcribe an ellipſis, whoſe axes are A B, D E.

The greater axis, A B, paſſing through the two foci F *f*, is called the tranſverſe axis; and the leſſer one D E, is called the conjugate, or ſecond axis: theſe two always biſect each other at right angles, and the center of the ellipſis is the point C, where they interſect. Any right line paſſing through the center, and terminated by the curve of the ellipſis on each ſide, is called a diameter; and two diameters, which naturally biſect all the parallels to each other, bounded by the ellipſis, are called conjugate diameters. Any right line, not paſſing through the center, but terminated by the ellipſis, and biſected by a diameter, is called the ordinate, or ordinate applicate, to that diameter. And a third proportional to two conjugate diameters, is called the latus rectum, or parameter of that diameter which is the firſt of the three proportionals.

The reaſon of the name is this: let B A, E D, be any two conjugate diameters of an ellipſis (*fig.* 2. where they are the two axes) at the end A, of the diameter A B, raiſe the perpendicular A F, equal to the latus rectum, or parameter, being a third proportional to A B, E D, and draw the right-line B F: then if any point P be taken in B A, and an ordinate P M be drawn, cutting B F in N, the rectangle under the abſciſs A P, and the line P N will be equal to the ſquare of the ordinate P M. Hence drawing N O parallel to A B, it appears that this rectangle, or the ſquare of the ordinate, is leſs than that under the abſciſs A P, and the parameter A F, by the rectangle under A P and O F, or N O and O F; on account of which deficiency, Apollonius firſt gave this curve the name of an ellipſis, from ελλειπειν, to be deficient.

In every ellipſis, as A E B D (*fig.* 2.) the ſquares of the ſemi-ordinates M P, *m p*, are as the rectangles under the ſegments of the tranſverſe axis $AP \times PB$, $Ap \times pB$, made by theſe ordinates reſpectively; which holds uqually true of the circle, where the figures of the ordinates are equal to ſuch rectangles, as being mean proportionals between the ſegments of the diameter. In the ſame manner, the ordinates to any diameter whatever, are as the rectangles under the ſegments of that diameter.

As to the other principal properties of the ellipſis, they may be reduced to the following propoſitions: 1. If from any point M in an ellipſis, two right lines, M F, M *f*, (*fig.* 1.) be drawn to the foci F, *f*, the ſum of theſe two lines will be equal to the tranſverſe axis A B. This is evident from the manner of deſcribing an ellipſis. 2. The ſquare of half the leſſer axis is equal to the rectangle under the ſegments of the greater axis, contained between the foci and its vertices; that is, $DC^2 = AF \times FB = Af + fB$. 3. Every diameter is biſected in the center C. 4. The tranſverſe axis is the greateſt, and the conjugate axis the leaſt, of all diameters. 5. Two diameters, one of which is parallel to the tangent in the vertex of the other, are conjugate diameters;

ameters; and *vice verſa*, a right line drawn through the vertex of any diameter parallel to its conjugate diameter, touches the ellipſis in that vertex. 6. If four tangents be drawn through the vertices of two conjugate diameters, the parallelogram contained under them will be equal to the parallelogram contained under tangents drawn through the vertices of any other two conjugate diameters. 7. If a right line, touching an ellipſis, meet two conjugate diameters produced, the rectangle under the ſegments of the tangent, between the point of contact and theſe diameters, will be equal to the ſquare of the ſemi-diameter, which is conjugate to that paſſing through the point of contact. 8. In every ellipſis, the ſum of the ſquares of any two conjugate diameters, is equal to the ſum of the ſquares of the two axes. 9. In every ellipſis, the angles FGI, fGH, (*ibid.* n° 1.) made by the tangent HI, and the lines FG, fG, drawn from the foci to the point of contact, are equal to each other. 10. The area of an ellipſis is to the area of a circumſcribed circle, as the leſſer axis is to the greater; and *vice verſa*, with reſpect to an inſcribed circle; ſo that it is a mean proportional between two circles, having the tranſverſe and conjugate axes for their diameters. This holds equally true of all the other correſponding parts belonging to an ellipſis.

The curve of any ellipſis may be obtained by the following ſeries: Suppoſe the ſemi-tranſverſe axis $CB=r$, the ſemi-conjugate axis $CD=c$, and the ſemi-ordinate $=a$; then the length of the curve $MB=a+\frac{r^2a^3}{6c^4}+\frac{4r^2c^2a^5-ra^5}{40c^8}+\frac{8c^4r^2a^7+r^6a^7-4c^2r^5a^7}{112c^{12}}$, &c. And, if the ſpecies of the ellipſis be determined, this ſeries will be more ſimple: for if $c=2r$, then $MB=a+\frac{a^3}{96r^2}+\frac{3a^5}{2048r^4}+\frac{113a^7}{458752a^6}+\frac{3419a^9}{75497472r^8}$, &c. This ſeries will ſerve for an hyperbola, by making the even parts of all the terms affirmative, and the third, fifth, ſeventh, &c. terms negative.

The periphery of an ellipſis, according to Mr. Simpſon, is to that of a circle, whoſe diameter is equal to the tranſverſe axis of the ellipſis, as $1-\frac{d}{2.2}-\frac{3d^2}{2.2.4.4}-\frac{3.3.5d^3}{2.2.4.4.6.6}-\frac{2.3.5.5.7d^4}{2.2.4.4.6.6.8.8}$, &c. is to 1, where d is equal to the difference of the ſquares of the axis applied to the ſquare of the tranſverſe axis.

Thoſe who deſire to be more particularly informed concerning the properties of the ellipſis, may conſult Simpſon's Conic Sections, and Wolfius's Elements of Mathematics, tom. 1. alſo Maclaurin's Fluxions, art. 609. ſeq. and the marquis de l'Hoſpital's Sect. Conic. lib. 6.

Ellipsis, in grammar and rhetoric, is a figurative way of ſpeaking, by which ſome word in a diſcourſe is retrenched, or omitted, when ſome violent paſſion will not let a perſon utter what he thinks.

ELLIPTIC, or Elliptical, ſomething belonging to an ellipſis. See Ellipsis.

ELLIPTICAL Arch, a part or ſegment of the curve of an ellipſis.

Elliptical arches are frequently preferred to thoſe that are circular, in various kinds of buildings, becauſe their ſpan may be equal to thoſe of the circle, without riſing to ſo great a height; and this is the reaſon why they have been preferred in bridges: but it muſt be remembered, that they will decreaſe in ſtrength, in proportion as they deviate from the circle. See the article Bridge.

ELLIPTOIDES, in geometry, a name uſed by ſome to denote infinite ellipſes, defined by the equation $ay^{m+n}=bx^m(a-x^n.)$

There are ſeveral ſpecies of elliptoides; as for inſtance, if $ay^3=bx^2(a-x)$ it is a cubical elliptoid; and if $ay^4=bx^2(a-x^2)$ it denotes a biquadratic elliptoid, which is an ellipſis of the third order, with reſpect to the Apollonian ellipſis.

ELM, *Ulmus*, in botany, a genus of trees, whoſe flower is deſtitute of a corolla; but conſiſts of a monophyllous, rough, turbinated cup, cut at the limb into five parts, coloured within, erect, and perſiſtent. The ſtamina are five ſubulated filaments, double the length of the calyx, topped with ſhort erect antheræ, having four furrows.

The fruit is a roundiſh, compreſſed, membranaceous drupe, including a ſeed of the ſame ſhape.

The flowers of the common elm comes out in March upon the ſlender twigs of the tree before the leaves, and ſtand in cluſters. The root is thick, hard, and woody, and ſends forth a number of fibres which ſpread to a great diſtance. The trunk or body, when old, is of a dark colour, and full of longitudinal wrinkles; but the young branches are ſmooth and tough. The leaves are wrinkled, rough, and doubly ſerrated on their edges. Their baſe is unequal, about three inches long, and two broad, of a dark green colour, and ſtand on ſhort pedicles.

This tree grows in plenty all over England: and its timber is of very great uſe for divers purpoſes, as for keels of ſhips, coffins, water-pipes, mill-works, knaves for wheels, handles for ſaws, &c. The clearneſs of its grain makes it alſo fit for all kinds of carved-work and ornaments relating to architecture.

There are ſeveral ſpecies of elm, ſuch as the witch-hazle, or broad leaved elm; the ſmooth leaved or witch elm, and ſeveral varieties with variegated leaves, which are noticed by the curious in plants. They all delight in one and the ſame ſoil, which ſhould be a good loam to have them in the greateſt perfection; not but they will do in other lands.

Theſe trees are increaſed by layers or ſuckers. The layers are to be preferred, as they generally ariſe with a better root: for if they are not well rooted when planted, they make very little progreſs in their growth, and frequently fail, notwithſtanding, to appearance, they may have made tolerable ſhoots for the firſt two or three years; therefore we would adviſe thoſe who plant elms to obſerve they are well rooted, as otherwiſe they may be deceived in their expectations.

Elms were formerly, when clipping was more in faſhion than at preſent, much in uſe for hedges, and no plants are more proper where it is required to break the violence of the winds; but they ſhould not be planted too near walls where fruit-trees are placed againſt, as they will by the extenſion of their roots, which ſpread to a greater diſtance than is commonly imagined, deprive the other plants of the nouriſhment requiſite for their welfare. In the park elms are delightful, being planted in avenues where their noble ſhade and verdure demonſtrates their grandeur, an example of which may be ſeen in Greenwich-park, whoſe delightful walks, ſo much reſorted to, are chiefly adorned with theſe beautiful and advantageous trees.

In planting elms, it is neceſſary to obſerve, that they ſhould not be planted too deep, particularly in loamy or clayey lands, in which latter caſe it is not amiſs to plant them on a little hill, when there will be the leſs danger of their ſucceeding; and likewiſe, if they are deſigned for timber, not to top the extreme part of the plant, as it impedes their growth, and occaſions their decaying ſoon.

With regard to their medicinal virtues, the leaves are aſtringent; and the bark good for aſſwaging the pains of the gout, by a decoction of it reduced to the conſiſtence of a ſyrup, and a third part of brandy added, and uſed as a liniment. It alſo makes a good gargariſm for ſore mouths, when occaſioned by heat and ſharpneſs of humours.

ELOCUTION, in rhetoric, the adapting words and ſentences to the things or ſentiments to be expreſſed. It conſiſts in elegance, compoſition, and dignity. The firſt, comprehending the purity and perſpicuity of a language, is the foundation of elocution. The ſecond ranges the words in proper order; and the laſt adds the ornaments of tropes and figures to give ſtrength and dignity to the whole. See STYLE, PERIOD, FIGURE, &c.

ELOGY, *Elogium*, a praiſe or panegyric beſtowed on any perſon or thing, in conſideration of its merit. The beauty of elogy conſiſts in an expreſſive brevity. Elogiums ſhould not have ſo much as one epithet, properly ſo called, nor two words ſynonymous. They ſhould ſtrictly adhere to truth; for extravagant and improbable elogies, rather leſſen the character of the perſon or thing they would extol.

ELOHA, in Scripture, the ſingular of Elohi, one of the names of God.

ELOHI, ELOI, or ELOHIM, in Scripture, one of the names of God. But it is to be obſerved, that angels, princes, great men, judges, and even falſe gods, are ſometimes called by this name. The ſequel of the diſcourſe is what aſſiſts us in judging rightly concerning the true meaning of this word. It is the ſame as Eloha, one being the ſingular, and the other the plural. However, Elohim is often conſtrued in the ſingular number, particularly when the true God is ſpoken of; but when falſe gods are ſpoken of, it is conſtrued rather in the plural.

ELONGATION, in aſtronomy, is the removal of a planet to the fartheſt diſtance it can be from the ſun, as it appears to an eye placed on the earth.

The word is Latin, from *elongo*, to be diſtant from.

The utmoſt elongation of Venus can be but 45 degrees, and that of Mercury but 30 degrees; which is the reaſon this planet is ſo rarely ſeen.

ELOPEMENT, in law, is where a married woman departs from her huſband, and cohabits with an adulterer; in which caſe the huſband is not obliged to allow her any alimony out of his eſtate, nor is he chargeable for neceſſaries for her of any kind. However, the bare advertiſing a wife in the Gazette, or other public papers, is not a legal notice to perſons in general not to truſt her; though a perſonal notice, given by the huſband to particular perſons, is ſaid to be good.

An action lies, and large damages may be recovered, againſt a perſon for carrying away and detaining another man's wife.

ELOQUENCE, the art of ſpeaking well, ſo as to affect and perſuade.

Cicero defines it the art of ſpeaking with copiouſneſs and embelliſhment.

Eloquence and rhetoric differ from each other, as the theory from the practice; rhetoric being the art which deſcribes the rules of eloquence, and eloquence that art which uſes them to advantage. For the moſt part, however, they are uſed indiſcriminately for each other.

ELUL, one of the Hebrew months, anſwering pretty nearly to our Auguſt. There are but twenty-nine days in it. It is the twelfth month of the civil year, and the ſixth of the eccleſiaſtical. Upon the ſeventh or ninth day of this month the Jews faſt, in memory of what happened after the return of thoſe who went to view the promiſed land.

ELUTRIATION, in metallurgy, the ſeparating the lighter matters from the mixed ores of metals, by means of great quantities of fair water.

ELYSIUM, or ELYSIAN FIELDS, in heathen mythology, certain plains, abounding with woods, fountains, verdure, and every delightful object; ſuppoſed to be the habitation of heroes and good men, after death.

ELYTROIDES, or VAGINALIS, in anatomy,

the ſecond proper membrane that involves the teſtes. See Testicle.

EMANCIPATION, in the Roman law, the ſetting free a ſon from the ſubjection of his father; ſo that whatever moveables he acquires, belong in propriety to him, and not to his father, as before emancipation.

EMARGINATED, among botaniſts, an appellation given to ſuch leaves as have a little indenting on their ſummits: when this indenting is terminated on each ſide by obtuſe points, they are ſaid to be obtuſely emarginated; whereas, when theſe points are acute, they are called acutely emarginated.

EMAUX de l'Escu, in heraldry, the metal and colour of the ſhield or eſcutcheon. See the article Shield.

EMBALMING is the opening a dead body, taking out the inteſtines, and filling the place with odoriferous and deſiccative drugs and ſpices, to prevent its putrifying.

EMBARGO, in commerce, an arreſt on ſhips, or merchandize, by public authority; or a prohibition of ſtate, commonly on foreign ſhips, in time of war, to prevent their going out of port; ſometimes to prevent their coming in; and ſometimes both, for a limitted time.

EMBASSADOR, or Ambassador. See Ambassador.

EMBASSY, the office or function of an ambaſſador.

EMBATTLED, in heraldry, the ſame with crenelle. See Crenelle.

EMBER-Weeks, or Days, in the Chriſtian church, are certain ſeaſons of the year ſet apart for the imploring God's bleſſing, by prayer and faſting, upon the ordinations performed in the church at ſuch times.

Theſe ordination-faſts are obſerved four times in the year, viz. the Wedneſday, Friday, and Saturday after the firſt Sunday in Lent, after Whit-Sunday, after the fourteenth of September, and the thirteenth of December; it being enjoined, by a canon of the church, that deacons and miniſters be ordained, or made, only upon the Sundays immediately following theſe ember-faſts.

EMBLEM is a kind of painted ænigma, or certain figures delineated or cut metaphorically, expreſſing ſome action, with reflections underneath, which in ſome meaſure explain the ſenſe of the device, and at the ſame time, inſtruct us in ſome moral truth, or other matter of knowledge.

EMBLEMENTS, among lawyers, denote the profits of ſown lands; but are ſometimes uſed, more largely, for any products that naturally ariſe from the ground.

EMBOLISMIC, intercalary, or belonging to the emboliſmus.

The word is derived from the Greek εμβαλλω, to inſert, or put in.

EMBOLISMUS, the exceſs of the ſolar year above the lunar, whereby the lunations happen every ſubſequent year eleven days ſooner than in the foregoing, which, when they amount to thirty-days, make a new month, called the emboliſmical lunation, or emboliſmatical month; which muſt be added to make the common lunar year equal to the ſolar.

EMBOLUS, the moveable part of a pump, or ſyringe, called alſo the piſton or ſucker. See the articles Piston, Pump, Syringe, &c.

EMBOSSING, or Imbossing, in architecture and ſculpture, the forming or faſhioning works in relievo, whether cut with a chiſſel, or otherwiſe.

EMBRACE *the Volt*, in the manege. A horſe is ſaid to embrace a volt when, working upon volts, he makes a good way every time with his fore-legs.

EMBRASURE, in architecture, the enlargement made of the aperture of a door or window on the inſide of a wall; its uſe being to give the greater play for the opening of the door, or caſement, or to admit the more light. When the wall is very thick, they ſometimes make embraſures on the outſide.

Embrasure, in fortification, a hole or aperture in a parapet, through which the cannon are pointed to fire into the moat or field.

Embraſures are generally twelve feet diſtant from one another, every one of them being from ſix to ſeven feet wide without, and about three within: their height above the platform is three feet on that ſide towards the town, and a foot and a half on the other ſide towards the field; ſo that the muzzle may be ſunk on occaſion, and the piece brought to ſhoot low.

EMBROCATION, in ſurgery and pharmacy, an external kind of remedy, which conſiſts in an irrigation of the part affected, with ſome proper liquor, as oils, ſpirits, &c. by means of a woollen or linen cloth, or a ſponge, dipped in the ſame.

EMBROIDERY, a work in gold, or ſilver, or ſilk thread, wrought by the needle upon cloth, ſtuffs, or muſlin, into various figures. In embroidering ſtuffs, the work is performed in a kind of loom, becauſe the more the piece is ſtretched, the eaſier it is worked.

EMBRYO, in phyſiology, the firſt rudiments of an animal in the womb, before the ſeveral members are diſtinctly formed; after which period it is denominated a fœtus. See the articles Conception, Generation, and Foetus.

Embryo Plant, the ſame with plantula ſeminalis. See the article Plantula.

EMBRYOTHLASTES, in midwifery, an inſtrument contrived for breaking the bones, for the more eaſy extraction of the fœtus, in difficult labours.

EMBRYOTOMY, the cutting a fœtus to pieces whilſt in the womb, practiſed in caſes of neceſſity, when there is no other way of ſaving the mother.

EMBRYULCUS, a hook for extracting the child in difficult labours.

EMERALD, *Smaragdus*, in natural hiſtory, the moſt beautiful of all the claſs of coloured gems, when perfect. It is found ſometimes in the roundiſh or pebble form, ſometimes in the columnar or cryſtalline one; the pebble emeralds, however, are the moſt valued; there are multitudes found of the ſize of a large pin's head, for one of any tolerable bigneſs; though now and then there occur ſtones of the ſize of a horſe-bean, and even up to that of a walnut, tho' this laſt very rare. The pebble emeralds are found looſe in the earth of mountains, and in the beds of rivers; the cryſtalliform ones are uſually met with adhering to a white, opaque, cryſtalline matter, though ſometimes to pieces of jaſper or of the praſius, a coarſer and ſofter gem of the ſame colour, only with ſome tinge of a yellowiſh caſt, and called the root of the emerald. The pebble emeralds are, in their natural ſtate, bright and tranſparent, though leſs gloſſy than the columnar ones; both are always of a perfect and pure green. It has this green in all the different ſhades, from very dark to extremely pale, and is probably ſometimes colourleſs, though the Engliſh jewellers call it white ſapphire.

The ſmaragdus of the ancients, properly ſo called, was evidently the ſame with our emerald; though they comprehended alſo under this name every gem, or even ſtone of any conſiderable beauty, and of a green colour.

To counterfeit EMERALDS. Take of natural cryſtal, four ounces; of red lead, four ounces; verdigriſe, forty-eight grains; crocus martis, prepared with vinegar, eight grains; let the whole be finely pulveriſed and ſifted; put this into a crucible, leaving one inch empty; lute it well, and put it into a potter's furnace, and let it ſtand there as long as they do their pots. When cold, break the crucible, and you will find a matter of a fine emerald-colour, which, after it is cut and ſet in gold, will ſurpaſs in beauty an Oriental emerald.

EMERGENT Year, in chronology, the ſame with epocha, whence any æra, or method of reckoning time commences: ſuch is that of the creation of the world, of the birth of our Saviour. See the article Epocha.

EMERSION, in philoſophy, is the riſing of any ſolid above the ſurface of a fluid, eſpecially lighter than itſelf, into which it had been violently immerged or thruſt.

Emersion, in aſtronomy, is the time when any planet that is eclipſed, begins to emerge or get out of the ſhadow of the eclipſing body.

EMERY, *Smiris*, a compact ſtone, ſo hard as to cut glaſs like the diamond; impregnated with iron, and a very ſmall portion of copper. It is met with in Norway, Sweden, England, Saxony, and other countries. Bruckman relates, that the emery found at St. Georgenſtadt, in Miſnia, is ſuperior to the Spaniſh. It is uſed for cutting and poliſhing precious ſtones, for poliſhing agate, porphyry, marble, glaſs, metalline ſpecula, iron and ſteel, and the various utenſils and ornaments made of theſe kinds of ſubſtances: for theſe purpoſes the emery is ground in mills, the powder paſſed through ſieves of different degrees of fineneſs, and thus divided into different ſortments, the fineſt of which, for the nicer uſes, are further divided by waſhing them over ſeveral times with water.

Putty of Emery, a kind of dirty matter found on the lapidaries wheels, containing part of the powder of emery.

EMETICS, *Emetica*, are medicines which induce vomiting.

EMETOLOGY, that part of medicine which treats of emetics.

The word is formed from the Greek, εμετος, a vomit, and λογος, a diſcourſe.

EMINENCE, a title of honour peculiar to cardinals. See the article Cardinal.

Eminence, in the military art, a high or riſing ground, which overlooks and commands the low places about it: ſuch places within cannon-ſhot of a fort, are a great diſadvantage; for if the beſiegers become maſters of them, they can, from thence, fire into the fort.

EMINENTIAL Equation, an artificial equation, containing another equation eminently: it is ſometimes uſed in the inveſtigation of the areas of curved-lined figures. See Equation.

EMISSARY, in a political ſenſe, a perſon employed by another to ſound the opinions of people, ſpread certain reports, or act as a ſpy over other people's actions. See the article Spy.

EMMENAGOGUES, Emmenagoga, in phyſic, are medicines which promote the menſes or monthly courſes.

EMOLLIENTS are ſuch medicines as ſheathe and ſoften the aſperities of the humours, and relax and ſupple the ſolids at the ſame time.

EMPALEMENT *of flowers*, among the botaniſts, the ſame with calyx. See the article Calyx.

EMPASTING, or Impasting, in painting, is the laying on of colours thick and bold, or the applying ſeveral lays of colours, ſo as they may appear thick.

The term is alſo uſed when the colours are laid diſtinct and aſunder, and not ſoftened or loſt in each other. See the article Colouring.

EMPATTEMENT, in fortification, the ſame with talus. See the article Talus.

EMPERESS, or Empreſs, denotes either the wife of an emperor, or a woman who governs ſingly an empire, in her own right.

EMPEROR, *Imperator*, a title of honour among the ancient Romans, conferred on a general who had been victorious, and now made to ſignify a ſovereign prince, or ſupreme ruler of an empire.

EMPETRUM, berry-bearing-heath, in botany, a genus of the diœcia claſs of plants in the Linnæan ſyſtem, the flower of which conſiſts of three oval oblong petals: in the male are inſerted three long, propendent, hairy ſtamina: and the fruit of the female flower is an orbiculated, depreſſed, unilocular berry, larger than the cup, containing nine ſeeds placed circularly.

EMPHASIS, in rhetoric, a particular ſtreſs of the voice and action, laid on ſuch parts or words of the oration, as the orator wants to enforce upon his audience. See Accent.

EMPHYSEMA, in phyſic, is any flatulent tumour, generally taken for a ſoft one, ariſing from air that is contained in the cells of the membrana celluloſa.

The word is Greek, from εν and φυσαω, to inflate,

EMPIRE, *Imperium*, in political geography, a large extent of land, under the juriſdiction or government of an emperor. See the article Emperor.

EMPIRIC, an appellation given to thoſe phyſicians who conduct themſelves wholly by their experience, without ſtudying phyſic in a regular way. Some even uſe the term, in a ſtill worſe ſenſe, for a quack who preſcribes at random, without being at all acquainted with the principles of the art.

EMPLASTER, *Emplaſtrum*, in pharmacy, the ſame with plaſter. See Plaster.

EMPYEMA, in phyſic, is, ſtrictly ſpeaking, a collection of purulent matter, in any part whatſoever; but it generally ſignifies that in the cavity of the breaſt only; and which ſometimes happens upon the opening of abſceſſes, or ulcerations of the lungs, or membranes incloſing the thorax.

The word is derived from the Greek, εν, and πυον, purulent matter.

EMPYREUM, a term uſed by divines for the higheſt heaven, where the bleſſed enjoy the beatific viſion.

EMPYREUMA, among chemiſts and phyſicians, the fiery taſte or offenſive ſmell which brandies, with.
and other bodies prepared by fire, are impregnated

EMRODS, or Hæmorrhoids. See the article Hæmorrhoids.

EMULGENT, or Renal Arteries, thoſe which ſupply the kidneys with blood; being ſometimes ſingle, ſometimes double on each ſide. See Artery.

EMULSION, in pharmacy, properly ſignifies medicines which reſemble milk. Thus ſolutions of gums, reſins, or ſpermaceti, made by means of the yolk of an egg, in a proper vehicle, are called emulſions.

EMUNCTORY, in anatomy, a general term for all thoſe parts which ſerve to carry off the excrementitious parts of the blood and other humours of the body. Such more eſpecially are the kidneys, bladder, and moſt of the glands.

EMUSCATION, in gardening and huſbandry, implies the clearing trees from moſs, &c.

ENÆMON, εναιμων, in medicine, an epithet often applied by Hippocrates and Galen, to ſuch topical medicines as are appropriated to a wound newly inflicted, before the blood be ſtopped.

ENÆOREMA, in medicine, that pendulous ſubſtance which floats in the urine. It is alſo called ſublimamentum, and nubeculæ, from its reſemblance to little clouds.

ENALLAGE, in grammar, is when a poſſeſſive pronoun is put for a relative, or one mood or tenſe of a verb is put for another, &c.

Enallage, in rhetoric, is a figure whereby the diſcourſe is changed and reverſed, contrary to all the rules of the language; but this is not done altogether at pleaſure, or without reaſon.

ENALURON, according to Guillim, is a border charged all round with birds; though others will have it to ſignify, in orle, or form of a border.

ENAMEL, vulgarly called Amel, is a kind of coloured glaſs, uſed in painting in enamel.

Enamel-*Painting*, a ſpecies of painting differing from other kinds of painting, in employing, as a vehicle for the colours to hold the parts together, and bind them to the ground they are laid upon, glaſs or ſome vitreous body; which being mixed with the colours, and fuſed or melted by means of heat, becomes fluid; and having incorporated with the colours in that ſtate, forms together with them a hard maſs when grown cold; and anſwers, therefore, the ſame end in this, as oil, gum-water, ſize, or varniſh, in the other kinds of painting.

ENARTHROSIS, in anatomy, a ſpecies of diarthroſis. See the article Diarthrosis.

ENCÆNIA, the name of three ſeveral feaſts celebrated by the Jews in memory of the dedication, or rather purification, of the temple, by Judas Maccabeus, Solomon, and Zorobabel.

This term is likewiſe uſed in church hiſtory for the dedication of Chriſtian churches.

ENCAMPMENT, the pitching of a camp. See the article Camp.

ENCANTHIS, in ſurgery, a tubercle ariſing either from the caruncula lachrymalis, or from the adjacent red ſkin; ſometimes ſo large, as to obſtruct not only the puncta lachrymalia, but alſo part of the ſight, or pupil itſelf.

It is of two kinds, viz. mild, without hardneſs or pain; or malignant, which is livid and very painful. The mild kind is to be treated firſt by ſcarifying, and afterwards applying eſcharotic or cauſtic medicines; and if this proves inſufficient, the tumour may be touched, but with great caution, with lapis infernalis; and to divert the humours from the eye, iſſues and ſetons, with phlebotomy and cooling purges, are proper. If all theſe fail, the ſurgeon is to extirpate the tumour; in which caſe it is better to leave part of the morbid tubercle, than cut off any part of the lachrymal caruncle, as the remains of it may be afterwards cleared away by eſcharotics. After the operation, it is proper to apply deterging and healing medicines, or a collyrium of lapis tutiæ, myrrh, &c. till the wound is healed.

As to the malignant encanthis, inclining to be cancerous, it is generally better to let it alone, and to mitigate its uneaſineſs with cooling and lenient collyria, rather than exaſperate it by the operation, or by eſcharotic medicines.

ENCAUSTICE and ENCAUSTUM, the ſame with enamelling and enamel.

ENCEINTE, in fortification, is the wall or rampart which ſurrounds a place, ſometimes compoſed of baſtions or curtains, either faced or lined with brick or ſtone, or only made of earth. The enceinte is ſometimes only flanked by round or ſquare towers, which is called a Roman wall.

ENCEPHALI, in medicine, worms generated in the head, where they cauſe ſo great a pain, as ſometimes to occaſion diſtraction.

ENCEPPE, in heraldry, denotes fettered, chained, or girt about the middle, as is uſual with monkeys.

ENCHANTER, a perſon ſuppoſed to practiſe enchantment, or faſcination.

ENCHASING, INCHASING, or CHASING, the art of enriching and beautifying gold, ſilver, and other metal-work, by ſome deſign, or figures repreſented thereon, in low relievo.

ENCHYSMA, in medicine, the ſame with clyſter. See the article CLYSTER.

ENCLITICA, in grammar, particles which are ſo cloſely united with other words, as to ſeem part of them, as in *virumque, &c.*

There are three enclitic particles in Latin, viz. *que*, *ne*, *ve*; but there are a great many in the Greek, as τȣ, τε, μȣ, μοι, σȣ, σοι, &c.

ENCRATITES, *Encratitæ*, in church hiſtory, heretics who appeared towards the end of the ſecond century: they were called Encratites, or Continentes, becauſe they gloried in abſtaining from marriage, and the uſe of wine and animal food. Their chaſtity, however, was a little ſuſpected, on account of their uſing all ſorts of means to draw women into their ſect, and always keeping company with them.

ENCROACHMENT, or INCROACHMENT, in law. See INCROACHMENT.

ENCYCLOPÆDIA, the circle of arts and ſciences.

The word is formed from the Greek εν, in, κυκλος, a circle, and παιδεια, art, ſcience, or learning.

ENDECAGON, in geometry, the ſame with hendecagon. See HENDECAGON.

ENDEMIC, or ENDEMICAL DISEASES, thoſe to which the inhabitants of particular countries are ſubject more than others, on account of the air, water, ſituation, and manner of living.

The word is derived from the Greek εν, in, and δημος, people.

ENDIVE, in botany, a plant much uſed as a ſallad in winter with us, of which there are different varities; but the ſort which is moſt cultivated here is the curled leaved endive. The ſeaſons for ſowing the ſeeds is at different periods, to continue the plants in perfection, as in May, June, July and Auguſt: they are afterwards planted out in rows at about a foot aſunder; and when grown to their full ſize of foliage, ſhould be blanched in order to make them more tender, and to take off the bitterneſs which they have when green. Thoſe of the early ſowing may be only tied up to whiten them: but thoſe for winter uſe ſhould be taken up when dry, and laid in on the ſide of a trench of earth to their tops, which will prevent the froſt or wet from damaging them, obſerving to cloſe their leaves ſo as no earth may get in their hearts.

Another ſort, called by ſome Batavian endive, hath broad leaves; and in taſte and appearance approaches nearer to lettuce than the other ſorts. This of late years have been introduced into the Engliſh gardens, and is managed as the former.

For the generical characters and medicinal virtues of endive. See the article CICHORIUM, of which it is a ſpecies.

ENDORSE, in heraldry, an ordinary, containing the eighth part of a pale, which Leigh ſays is only uſed when a pale is between two of them.

ENDORSED, *Endorſé*, in heraldry, is ſaid of things borne back to back, more uſually called adoſſé.

ENDOWMENT, in law, denotes the ſettling a dower on a woman; though ſometimes it is uſed figuratively, for ſettling a proviſion upon a parſon on the building of a church; or the ſevering a ſufficient portion of tithes for a vicar, when the benefice is appropriated.

ENEMA, in medicine, the ſame with clyſter. See the article CLYSTER.

ENEMY, in law, an alien or foreigner, who publicly invades the kingdom.

ENERGUMENS, in church hiſtory, perſons ſuppoſed to be poſſeſſed by the devil, concerning whom there

Ellipse.

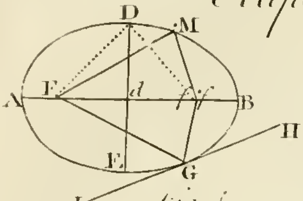


Fig. 1.

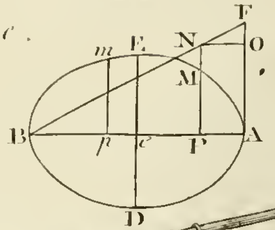


Fig. 2.

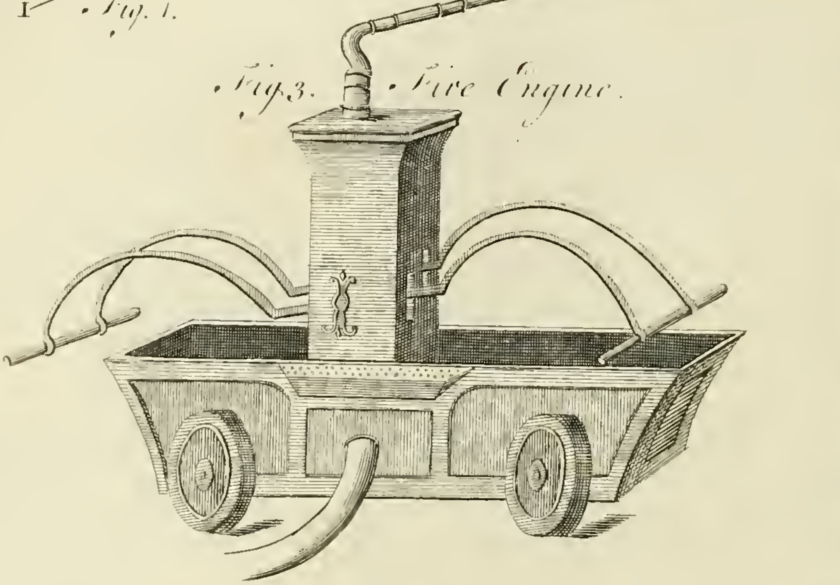


Fig. 3. Fire Engine.

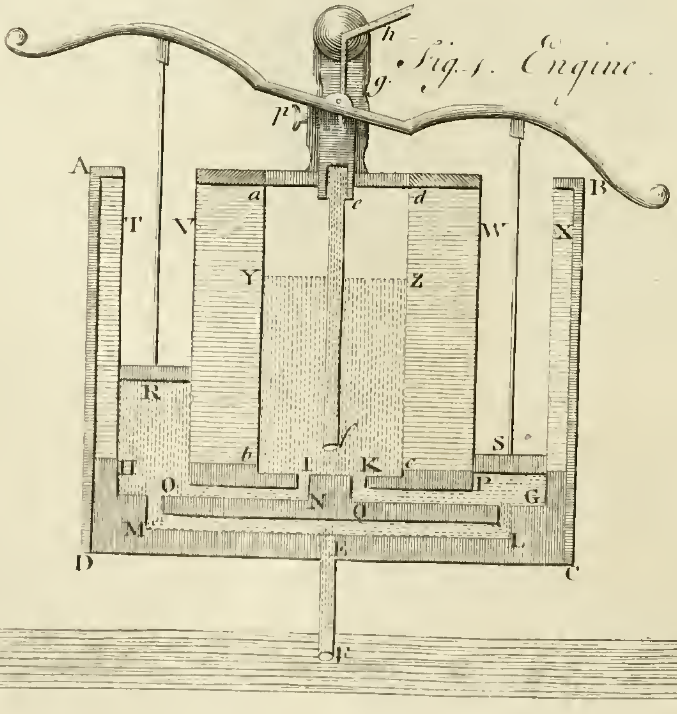


Fig. 4. Engine.

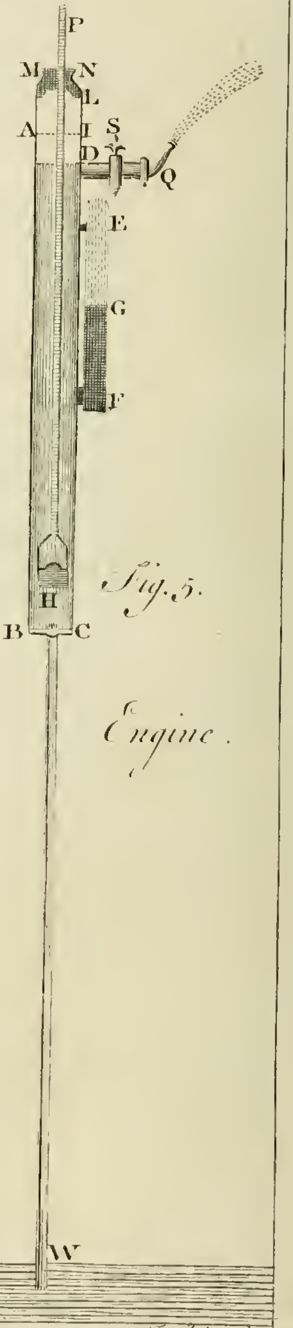


Fig. 5.

Engine.

T. Lodge Sculp.

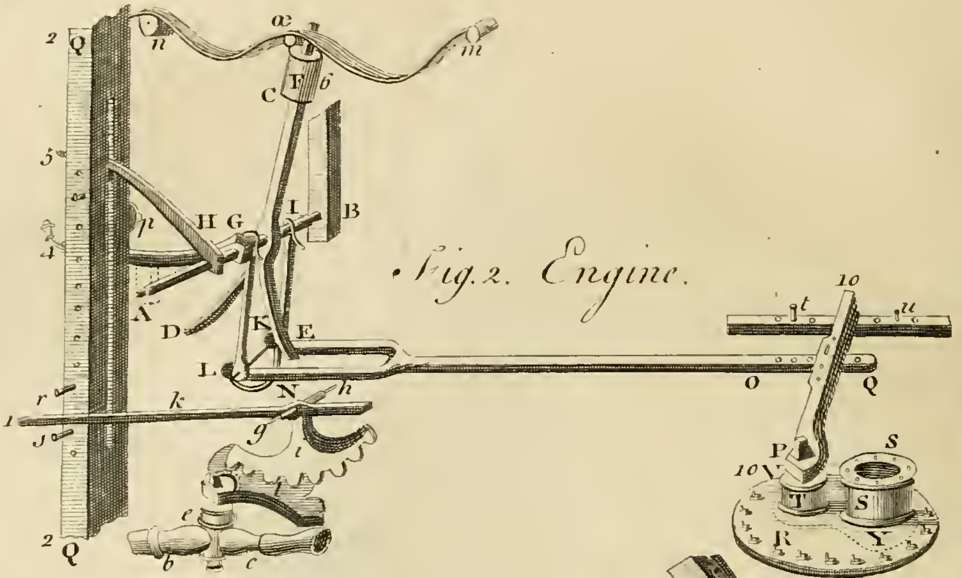
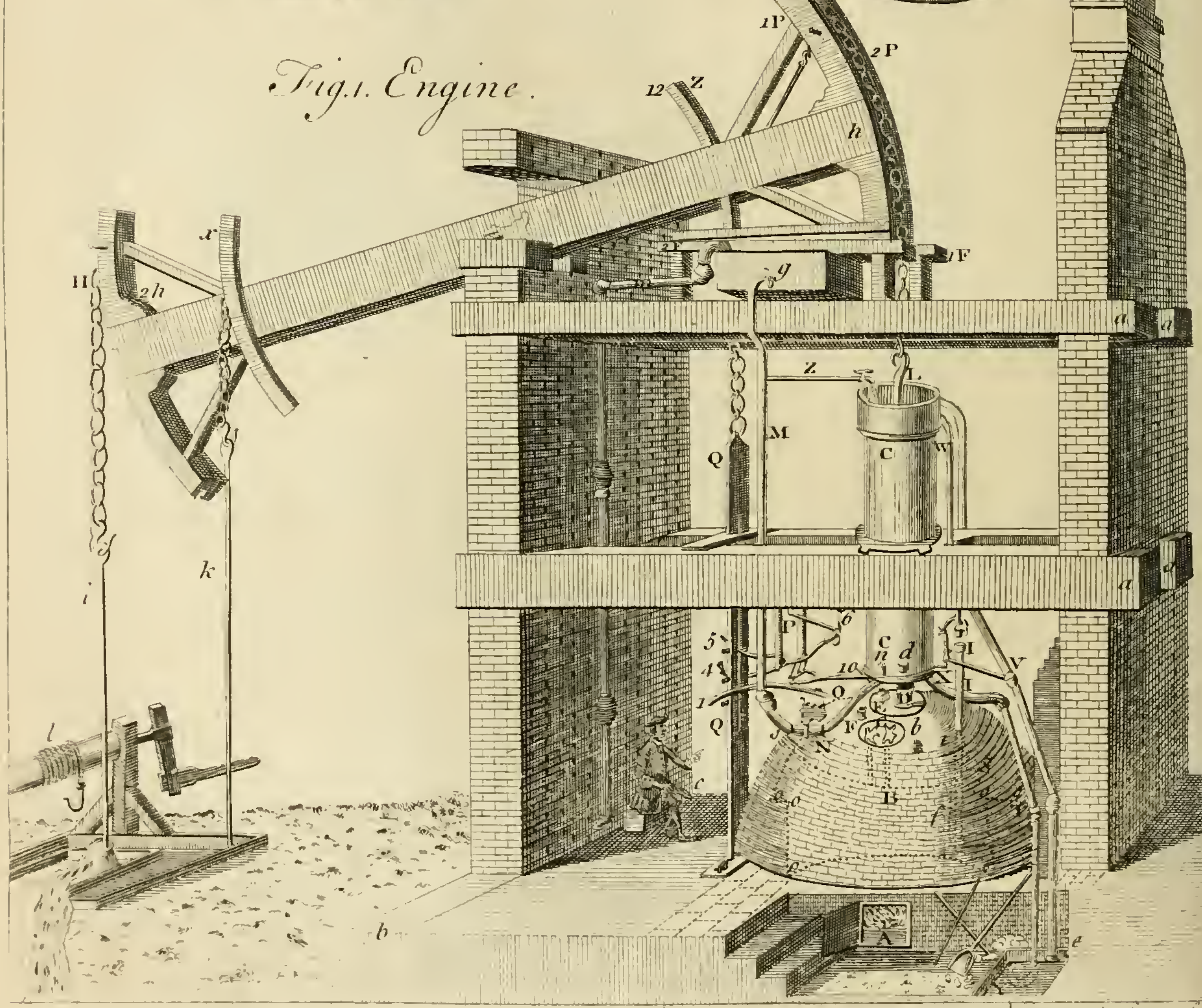


Fig. 2. Engine.

Fig. 1. Engine.



J. Lodge sculp.

there were many regulations among the primitive Chriſtians.

They were denied baptiſm, and the euchariſt; at leaſt this was the practice of ſome churches: and though they were under the care of exorciſts, yet it was thought a becoming act of charity to let them have the public prayers of the church, at which they were permitted to be preſent. See the article Exorcism.

ENERGY, ενεργεια, a term of Greek origin, ſignifying the power, virtue, or efficacy of a thing. It is alſo uſed, figuratively, to denote emphaſis of ſpeech. See Emphasis.

ENFILADE, in the art of war, is uſed in ſpeaking of trenches, or other places, which may be ſcoured by the enemy's ſhot, along their whole length. In conducting the approaches at a ſiege, care muſt be taken that the trenches be not enfiladed from any work of the place. See the article Trenches.

ENFRANCHISEMENT, in law, the incorporating a perſon into any ſociety or body politic: thus, where any perſon is enfranchiſed, or made free, of any city, borough, or company, he is ſaid to have a freehold therein during life; and cannot, for barely endeavouring any thing againſt the corporation, forfeit the ſame.

Naturalization is alſo another kind of enfranchiſement. See Naturalization.

ENGASTRIMYTHI, in pagan theology, the pythians or prieſteſſes of Apollo, who delivered oracles from within, without any action of the mouth or lips.

ENGINE, in mechanics, is a compound machine, made of one or more mechanical powers, as levers, pullies, ſcrews, &c. in order to raiſe, project, or ſuſtain any weight, or produce any effect which could not be eaſily effected otherwiſe.

Engines are extremely numerous; ſome uſed in war, as the battering-ram, balliſta, waggons, chariots, &c. others in trade and manufactures, as cranes, mills, preſſes, &c. others to meaſure time, as clocks, watches, &c. and others for the illuſtration of ſome branch of ſcience, as the orrery, cometarium, and the like. See Battering-Ram, Ballista, &c.

In general we may obſerve, concerning engines, that they conſiſt of one, two, or more of the ſimple powers variouſly combined together; that in moſt of them the axis in peritrochio, the lever, and the ſcrew, are the conſtituent parts; that in all a certain power is applied to produce an effect of much greater moment; and that the greateſt effect, or perfection, is when it is ſet to work with four-ninths of that charge which is equivalent to the power, or will but juſt keep the machine in equilibrio. See the articles Maximum and Mechanics.

In all machines, the power will juſt ſuſtain the weight, when they are in the inverſe ratio of their diſtances from the center of motion. See the article Power and Equilibrium.

It being of the utmoſt importance to diminiſh the friction of engines, ſeveral contrivances have been invented for that purpoſe. See the article Friction.

Engine *for extinguiſhing fires*, a machine for raiſing a conſiderable quantity of water, in one continued ſtream, for the extinguiſhing accidental fires. See a perſpective view of the whole engine, ready for working, in plate XLVIII. *fig.* 3.

The nature and effect of this engine will be eaſily underſtood from a perpendicular ſection of it, repreſented, *fig.* 4. The water is raiſed by the preſſure of the atmoſphere, by the force of piſtons, and by the ſpring of condenſed air, in the following manner: thus, when the piſton R is raiſed, a vacuum would be made in the barrel T V, did not the water follow it from the inferior canal E M, through the valve H, which riſes through the tube E F, immerſed in the water of a veſſel, by the preſſure of the atmoſphere on the ſurface thereof. By the depreſſion of the piſton R, the water in the barrel T V is forced through the ſuperior canal O N, to enter by the valve I, into the air-veſſel *a b c d*; and the like being done alternately by the other barrel W X, and its piſton S, the air-veſſel is by this means continually filling with water, which greatly compreſſes the air above the ſurface of the water in the veſſel, and thereby proportionably augments its ſpring, which is at length ſo far increaſed, as to re-act with great force on the ſurface Y Z of the ſubjacent water; which aſcending through the ſmall tube *e f*, to the ſtop-cock *p*, is there, upon turning the cock, ſuffered to paſs through a pipe *h*, fixed to a ball and ſocket, from the orifice of which it iſſues with a great velocity, to a very great height or diſtance, in a continued ſtream, directed every way, or to any particular place, by means of the ball and ſocket.

The greateſt artifice of this engine is its contrivance to produce a continual ſtream, which is done by compreſſion, and the conſequent increaſed elaſticity of the air in the barrel *a b c d*, called the air-veſſel: for the air, being an elaſtic fluid, will be capable of compreſſion in any degree by the water forced in through the valves at I K; and, ſince the force of the air's ſpring will always be inverſely as the ſpace which it poſſeſſes, it follows, that when the air-veſſel is half full of water, the air will be compreſſed into half the ſpace it poſſeſſed at firſt, and therefore its ſpring will be twice as great as at firſt.

But this ſpring at firſt was equal to the preſſure of the atmoſphere; for if it was not, it could not have ſuſtained or reſiſted the preſſure of the atmoſphere which ſtood over it, and conſequently could not have filled the veſſel before the water was driven in; which yet we find it did, and maintained an æquilibrium with the common air.

The veſſel then being half filled with water, or the air compreſſed into half its firſt ſpace, its ſpring will be in this caſe equal to twice the preſſure of the atmoſphere; and therefore, when the ſtop-cock at *p* is turned, the air within the ſubjacent water, with twice the force it meets with from the external air in the pipe *ef*, will cauſe the water to ſpout out of the engine to the height of thirty-two or thirty-three feet, if the friction be not too great.

When the air-veſſel is $\frac{2}{3}$ full of water, the ſpace which the air takes up is only $\frac{1}{3}$ of its firſt ſpace; whence its ſpring being three times as great as that of the common air, it will project the water with twice the force of the atmoſphere, or throw it to the height of 64 or 66 feet. In the ſame manner, when the air-veſſel is $\frac{1}{4}$ full of water, the air will project it to the height of 96 or 99 feet; and when $\frac{4}{5}$ full of water, to the height of 132 feet.

As the air-veſſel is the cauſe of the continual ſtream, we may naturally infer that, if ſuch an air-veſſel were adapted to the common houſe-pump, it would then become a fire-engine, or very uſeful for extinguiſhing fires that may happen in or near the houſe. Now this may be effected in a manner, either the ſame with, or analogous to, that which follows: ABCD (*fig.* 5.) is the barrel of the pump, PH the rod and piſton; CW the pipe going down to the water of the well at W; towards the lower part of the barrel is a ſhort tube, by which the air-veſſel FE is fixed to, and communicated with, the barrel of the pump. AMNL is a collar of leather ſo fixed on the top of the barrel, and adapted to the rod, that it may move freely in the leather, without permitting the air to paſs in or out between. The nozzle or ſpout D has a ſtop-cock S to ſhut off the water, or let it paſs out as required. Q is a piece ſcrewed on to direct the ſtream by a ſmall pliant leathern pipe at the end.

Now it is plain, when the piſton is raiſed from the bottom of the pump-barrel, the water above it will be forced into the air-veſſel, and there compreſs the air, the ſtop cock being ſhut; it will alſo compreſs the air on the top of the barrel, for the water will not be higher than the ſpout D at firſt, when the ſtop-cock is ſhut: but afterwards, as the air is confined, it will be compreſſed at top, and the water will riſe to I.

This compreſſed air, in each place, will act upon the water by its ſpring, and upon turning the ſtop-cock, will force it out in a continual ſtream, through a pipe at Q; and with a greater or leſſer degree of force, as occaſion requires, that being abſolutely in the power of the perſon working the pump. This invention we owe to the learned Sir James Creed.

Fire ENGINE, or *Steam* ENGINE, a machine for raiſing water by the help of fire. The fire-engine is the moſt admirable, curious, and compounded machine that we find among all thoſe whoſe inventions have been owing to the diſcoveries of modern philoſophy, and which affords the greateſt advantages to mankind. The fire-engine is of two ſorts, of which we ſhall here give the theory and figures of each, according to the lateſt perfection in which they are made.

The marquis of Worceſter, in his century of inventions, publiſhed in the year 1663, is probably the firſt who propoſed raiſing great quantities of water by the force of fire turning water into a ſteam; and he mentions ſome engine of this kind, which he ſays played a continual ſtream, in the manner of a fountain, forty feet high. He alſo ſays, that a perſon attending it turned two cocks; that one veſſel of water being conſumed, another begins to force and re-fill with cold water; and this alternately and ſucceſſively, the fire being attended and kept conſtantly burning by the ſame perſon, in the interim between the turning the cocks.

Captain Savery, having read this account, immediately attempted to raiſe water by fire, and was the firſt who erected an engine for this purpoſe, in the form we have ſince had them. To ſecure the invention to himſelf, he purchaſed all the books that were to be found, printed by the marquis upon that occaſion, and burnt them; and at the ſame declared that he found out the method by accident. He made many experiments to bring the machine to perfection, and erected ſeveral for gentlemen's ſeats.

But the progreſs of the engine was ſtopped, till long time afterwards, when Mr. Newcomen and Mr. J. Cawley contrived another way to raiſe water by fire, where the ſteam to raiſe the water from the greateſt depths of mines is not required greater than the preſſure of the atmoſphere; and this is the preſent ſtructure of the engine, which is now of of about fifty-five years ſtanding.

We ſhall ſhew, under the article PUMP, that water may be drawn from any depth by a compound pump. Suppoſe the depth = 150 feet, and the diameter of the pump at plate XLIX. *fig.* 1. be $7\frac{3}{4}$ inches, then the weight of a cylindric column of water 150 feet high, and $7\frac{1}{4}$ inches diameter, will be about 3000 ℔ weight. If now the rod of this pump were hung by a chain to the end of the lever *hh*, as at H, and at the other end another power was applied, as at L, with a ſuperior force, the pump might be worked, and the water raiſed by that power.

Now this power cannot be human, or the ſtrength of man; for it will require a hundred men to pull down the beam, each pulling with the force of thirty pounds; and an hundred men to relieve them, when weary; for the pump in a mine muſt not ſtand ſtill: but two hundred men would be too expenſive. If we allow horſes, and one horſe equal to five men, there muſt be twenty horſes working at a time, and twenty

Fig. 1. Engine

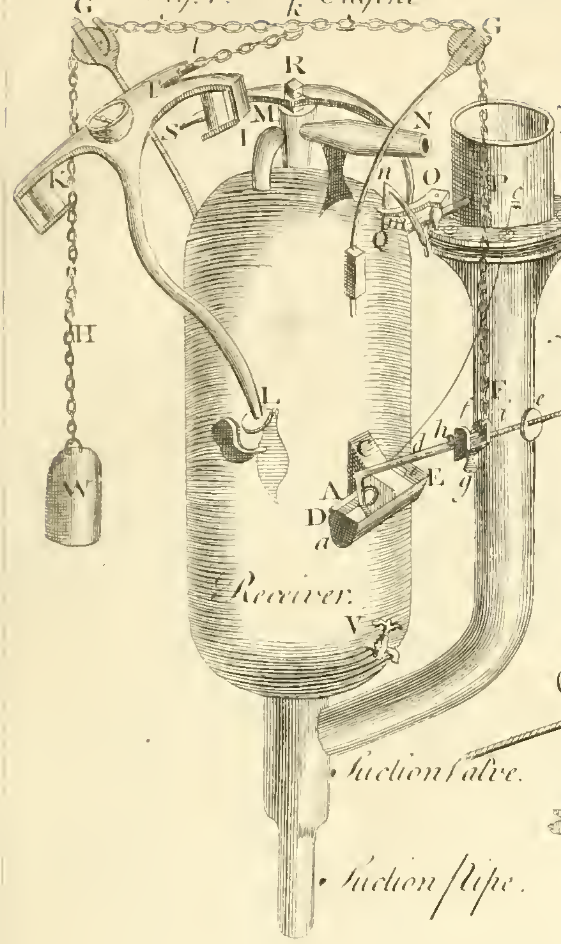
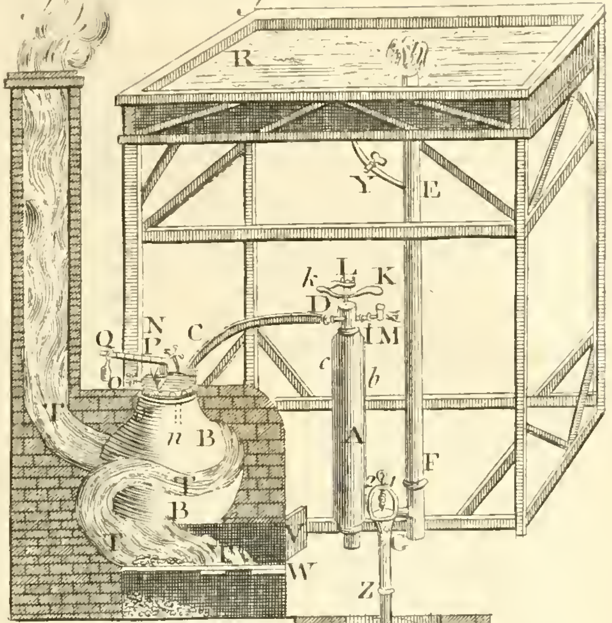
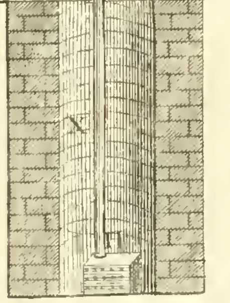
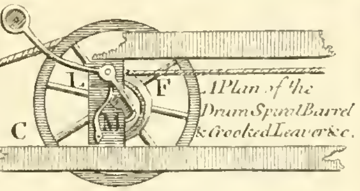


Fig. 2. Steam Engine.







A Plan of the Drum Spiral Barrel & Crooked Leaver &c.

Fig. 4.

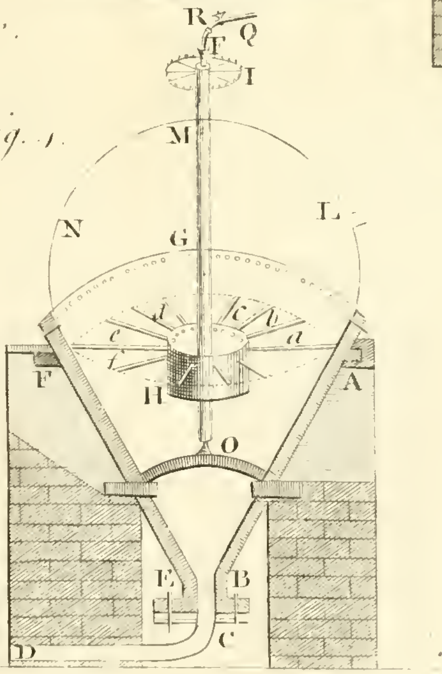
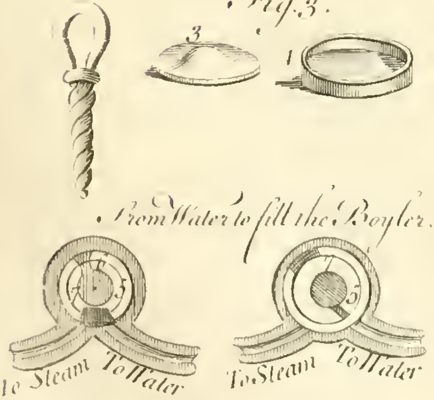
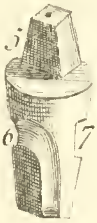
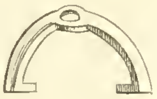


Fig. 3.







T. Jedge Sculp.

more to relieve theſe; which great number of horſes, though leſs expenſive than the men, will be found too great for moſt mines: and neither men nor horſes would be able to give more than fifteen or ſixteen ſtrokes in a minute.

Some other power therefore muſt be applied, and this may be effected as follows: B is a large boiler, whoſe water, by the fire under it, is converted into an elaſtic ſteam. The great cylinder C C is fixed upon it, and communicates with it by the pipe D *d*; on the lower orifice of which, within the boiler, moves a broad plate, by means of the ſteam-cock, or regulator E 10, ſtopping or opening the paſſage to prevent or permit the ſteam to paſs into the cylinder, as occaſion requires. The diameter of the pipe D is about four inches.

The ſteam in the boiler ought always to be a little ſtronger than the air, that when let into the barrel, it may be a little more than a balance to the external air, which keeps down the piſton at the bottom *d n*. The piſton being by this means at liberty, the pump-rod will, by its great weight, deſcend at the oppoſite end to fetch a ſtroke; for the weight of ſeventy or eighty yards of iron rod amounts to nine or ten hundred weight; whereas the piſton, and other weights at the other end, is not above four or four and a half hundred weight. The end of the lever at the pump, therefore, will always preponderate the other, and deſcend when the piſton is at liberty.

The handle of the ſteam cock E 10, being turned towards *n*, opens a pipe D to let in the ſteam; and being turned towards O, it ſhuts it off, that no more can enter. The piſton is now raiſed towards the top of the barrel at C, and the barrel is full of ſteam. The lever O 1 muſt then be lifted up, to turn, by its teeth, the injecting cock at N, which permits the water brought from the ciſtern *g*, by the pipe *g* M N, to enter the bottom of the barrel at *n*, where it flies up in the form of a fountain, and ſtriking againſt the bottom of a piſton, the drops, being driven all over the cylinder, will, by their coldneſs, condenſe the ſteam into water again, and precipitate it to the bottom of the barrel.

Mr. Henry Beighton made an experiment to determine the rarity of the ſteam, and found the content of the barrel of ſteam was 113 gallons; and ſince there were ſixteen ſtrokes in a minute, therefore $113 \times 16 = 1808$ gallons of ſteam per minute. He alſo obſerved, that the boiler required to be ſupplied with water at the rate of five pints per minute: and ſince 282 cubic inches make a gallon, $35\frac{1}{4}$ make a pint, and $5 \times 35\frac{1}{4} = 176\frac{1}{4}$ in five pints; alſo the cubic inches of ſteam are $1808 \times 282 = 509856$; if then we ſay, as $176\frac{1}{4} : 509856 :: 1 : 2893$; or one cubic inch of water is expanded into 2893 inches of ſteam; conſequently the ſteam in the barrel is reduced to $\frac{1}{2893}$ part, when turned to water by the jet of cold water; and therefore a ſufficient vacuum is made in the barrel, for the piſton to deſcend unbalanced, by the preſſure of the air.

The piſton being forced down, raiſes the other end of the lever, and conſequently the piſton of the pump which brings up and diſcharges the water at *p*. Now this whole operation of opening and ſhutting the ſteam regulator and injection-cock, will take up but little more than three ſeconds; and will therefore produce very well ſixteen ſtrokes in a minute.

That the ciſtern *g* may always be ſupplied with water, there is an arch *x* fixed near the arch H at the pump-end, from whence another pump rod *k*, with its piſton, draws water from a ſmall ciſtern near the mouth of a pit, ſupplied from the water raiſed at *p*, and forces it up the pipe *m m m* into the ciſtern *g*, which, therefore, can never want water.

That the leathers of the piſton C may be always ſupple and ſwelled out ſo as to be always air-lights, a ſmall ſtream of water is ſupplied from the injecting pipe M by the arm *z*. On the top of the cylinder is a larger part or cup L, to hold the water that lies on the piſton, leſt it ſhould overflow when the piſton is got to its greateſt height, as at W; at which time, if the cup be too full, the water will run down the pipe V to the waſte-well at Y.

The water in the boiler which waſtes in generating ſteam, is ſupplied by a pipe I *i* about three feet long, going into the boiler a foot below the ſurface of the water. On the top of this pipe is a cup or funnel I, ſupplied by the pipe W with water from the top of the ciſtern, which has the advantage of being always warm, and not ſo apt to check the boiling of the water in the copper.

That the boiler may not have the ſurface of the water too low, which would endanger burſting, or too high, which would not have room enough for ſteam, there are are two gage-pipes at G; one going a little below the ſurface of the water when at a proper height, and the other ſtanding a little above it. When every thing is right, the ſtop-cock of the ſhorter pipe, being open, gives only a ſteam, and that of the long one water; but, if otherwiſe, both cocks will give ſteam when the ſurface is too low, and both give water when it is too high; and hence the cock which feeds the boiler at I may be opened to ſuch a degree, as always to keep the ſurface of water to its due height.

The cold water, conſtantly injected into the cylinder to condenſe the ſteam, is carried off by the eduction-pipe *d* T Y, going from the bottom of the cylinder to the waſte-well Y, where going a little under water, it has its end turned up, with a valve Y, to keep the air from preſſing out into the pipe, but permitting the injected water coming the other way to be diſcharged, whereby the cylinder is kept empty.

Leſt the ſteam ſhould grow too ſtrong for the boiler, and burſt it, there is a valve fixed at *h*, with a perpendicular wire ſtanding up from the middle of it, to put weights of lead upon, by which to examine the ſtrength of the ſteam puſhing againſt it from within. Thus the ſteam is known to be as ſtrong as the air, if it will raiſe up ſo much weight on the valve, as is at the rate of fifteen pounds to an inch ſquare; becauſe that is the weight of air, nearly, on every ſquare inch. When the ſteam becomes ſtronger than is required, it will lift up the valve, and go out. This valve is called the puppet-clack.

The ſteam has always a variable ſtrength, yet never $\frac{1}{10}$ ſtronger or weaker than common air: for it has been found that the engine will work well when there is the weight of one pound on each ſquare inch of the valve *b*. This ſhews that the ſteam is then $\frac{1}{10}$ part ſtronger than the common air. Now as the height of the feeding-pipe from the funnel F to the ſurface of the water S *s* is not above three feet, and three feet and a half of water is $\frac{1}{10}$ of the preſſure of the air; if the ſteam were $\frac{1}{10}$ part ſtronger than air, it would puſh the water out at E; which, ſince it does not, it cannot be ſtronger than air, even in this caſe, where, the regulator being ſhut, it is moſt of all confined.

When the regulator is opened, the ſteam gives the piſton a puſh, which riſes it up a little way; then filling a greater ſpace, it comes to be of the ſame ſtrength, and ſo a balance to the atmoſphere; thus the piſton, being at liberty, riſes to the top W. The ſteam, now expanded into the whole capacity of the cylinder, is weaker than the air, and would not ſupport the piſton, were it not for the greater weight at the other end of the lever, which keeps it up. The ſteam each ſtroke drives the injected water of the preceding ſtroke out of the eduction pipe *d* T Y, and would itſelf follow, and blow out at the valve Y, which is not loaded, if it were ſtronger than the air, which it never does. If it were exactly equal to the ſtrength of the air, it would juſt drive all the water out at Y, but could not follow itſelf, the preſſure being on each ſide the valve equal by ſuppoſition. If it be weaker than the air, it will not force all the water out of the pipe *d* T Y, but the ſurface will ſtand, ſuppoſe, at T, where the column of water T Y, added to the ſtrength of the ſteam, is equal to the preſſure of the air. When the ſteam is $\frac{1}{10}$ weaker than the air, the height T Y = three feet and a half. Now, ſince the whole perpendicular diſtance from *d* to Y is but four feet, and the ſteam always ſufficient to expel the water; it is plain it can never be more than $\frac{1}{10}$ part weaker than the air, when weakeſt.

There is air in all the water injected; and though that air cannot be taken out or condenſed with the ſteam, yet will it precipitate and fall through the ſteam to the bottom of the cylinder, as being much heavier. For ſteam is to water, as 1 to 2893, in its denſity; but the denſity of air is to that of water, as 1 to 864, nearly; therefore, the rarity of ſteam is to that of air, as 2893 to 864; the air will, therefore, fall through the ſteam to the bottom, and from thence be driven out through a ſmall pipe opening into the cup at 4, on which is a valve. Now, when the ſteam firſt ruſhes into the cylinder, and is a little ſtronger than the outward air, it will force the precipitated air to open the valve at 4, and make its eſcape; but the ſteam cannot follow, becauſe it is weaker than the outward air, as the piſton gives it room by aſcending to expand. This valve, from the noiſe it makes, is called the ſnifting-clack.

Among the greateſt improvements of this engine, we may reckon that contrivance by which the engine itſelf is made to open and ſhut the regulator and injunction-cock, and that more nicely than any perſon attending could poſſibly do it. For this purpoſe, there is fixed to an arch 12, at a proper diſtance from the arch P, a chain, from which hangs a perpendicular piece or working beam QQ, which comes down quite to the floor, and goes through it in a hole, which it very exactly fits. This piece has a long ſlit in it, and ſeveral pin-holes and pins, for the movement of ſmall levers deſtined to the ſame office of opening and ſhutting the cocks, after the following manner:

Between two perpendicular pieces of wood on each ſide, there is a ſquare iron axis AB (*fig.* 2.) which has upon it ſeveral iron pieces of the lever kind. The firſt is the piece CED, called the Y, from its repreſenting that letter inverted by its two ſhanks E and D; on the upper part is a weight F to be raiſed higher or lower, and fixed, as occaſion requires. This Y is fixed very faſt upon the ſaid iron axle A B.

From the axle hangs a ſort of an iron ſtirrup I K L G, by its two hooks I G, and having on the lower part two holes K, L, through which paſſes a long iron pin LK, and keyed in the ſame. When this pin is put in, it is alſo paſſed through the two holes in the ends E, N, of the horizontal fork or ſpanner E Q N, joined at its end Q, to the handle of the regulator V 10. From Q to O are ſeveral holes, by which the ſaid handle may be fixed to that part of the end which is moſt convenient.

Upon this axis A B is fixed at right angles to the Y, an handle or lever G4 which goes on the outſide of the piece Q 2, Q 2, and lies between the pins. Another handle is alſo faſtened upon the ſame axle, viz. H 5, and placed at half a right angle to the former G 4; this paſſes through the ſlit of the piece Q 2, Q 2, lying on one of the pins. Hence we ſee, that when the working beam goes up its pin in the ſlit, it lifts up the ſpanner H 5, which turns about the axle ſo faſt, as to throw the Y, with its weight F, from C to 6, in which direction it would continue to move, after it had paſſed the perpendicular, were it not prevented by a ſtrap of leather fixed to it at *a*, and made faſt at the ends *m* and *n*, in ſuch a manner as to allow the Y to vibrate backwards and forwards about a quarter of a circle, at equal diſtances on this ſide, and that of the perpendicular.

As things are repreſented in the figure, the regulator is open, its plate TY being ſhewn on one ſide the pipe S, which joins the cylinder and boiler. The piſton is now up, and alſo the working beam near its greateſt height; the pin in the ſlit has ſo far raiſed the ſpanner H 5, that the weight F, on the head of the Y, is brought ſo far from *u*, as to be paſt the perpendicular, and ready to fall over towards *m*, which, when it does, it will by its ſhank E, with a ſmart blow, ſtrike the iron pin KL, and drawing the fork horizontally towards the beam Q, will draw the end 10 of the regulator towards 6, and thereby ſhut it, by ſlipping the plate Y under the holes of the throat-pipe S.

Immediately after the regulator is ſhut, the beam riſing a little higher, with its pin S on the outſide upon the lower part, lifts up the end *k* 1 of the handle of the injection-cock, and opens it by the turning of the two parts with teeth. The jet immediately making a vacuum, the beam again deſcends, and the pin *r*, depreſſing the handle *k* 1, ſhuts the injection-cock; and the beam continuing to deſcend, the pin *p* bears down the handle G 4, and throwing back the Y, its ſhank D throws forward the fork NQ, and again opens the regulator to admit freſh ſteam. After this, every thing returns as before; and thus is the engine moſt wonderfully contrived to work itſelf. After the engine had been made, as above deſcribed, for many years, it received another improvement of very great advantage; and that was, inſtead of feeding the boiler with warm water from the top of the cylinder, by the pipe W (*fig.* 1.) above, and F *f* below, they contrived to ſupply it with the ſcalding hot water which comes out of the eduction-pipe *d* TY, which now, inſtead of going to the waſte-well at Y, was turned into the boiler on the top part; and as the eduction-pipe before went out at the ſide of the cylinder, it was now inſerted in the bottom of the ſame; and though the preſſure of ſteam in the boiler be ſomewhat ſtronger in the cylinder, yet the weight of water in the eduction-pipe, being added to the force of ſteam in the cylinder, will carry the water down continually, by overcoming rhe reſiſtance in the boiler.

This is the lever-engine with the improvements of Mr. Newcomen and others; but as captain Savery's, or rather the marquis of Worceſter's, is very cheap in reſpect of this machine, and as it is alſo applicable with great advantage when the height to which the water is to be raiſed does not exceed 100 or 150 feet, we ſhall here ſubjoin a view of that engine, with the improvements of Dr. Deſaguliers.

The boiler BB (plate L. *fig.* 2.) is a large copper body of a globular form, which will beſt of all withſtand the very great force of ſteam, that is in this caſe neceſſary. Round the body of this boiler the fire and flame are conducted, as ſhewn at TTT. It has a copper cover ſcrewed on, which contains the ſteam-pipe CD, and two gage-pipes N, O, which, by turning their cocks, ſhew the height of the ſurface of the water within, as in the other engine.

On the ſame cover at P is a valve, over which lies a ſteelyard, with its weight Q to keep it down, the ſtrength of the vapour being this way moſt exactly eſtimated: for being in the nature of a lever of the third ſort, it is plain, if the beam of the lever be divided into ten equal parts, and the firſt of them be upon the middle of the valve, and the weight Q hangs at the ſecond, third, fourth, &c. diviſion, that then the force of the ſteam which can raiſe up the valve will be two, three, four, &c. times as great as the weight. If the area of the valve be a ſquare inch, and Q = 15 pounds, hanging at the ſecond diviſion, is raiſed by a ſteam puſhing up the valve, it will ſhew the ſteam will then preſs with the force of two atmoſpheres; but great care muſt then be taken about it, leſt the ſteam, ſo very ſtrong, burſt the boiler to pieces.

The ſteam is carried from the boiler to the copper-veſſel A, by means of the pipe CD; and is let into the ſame by turning the handle K of the ſteam-cock DI. The key of this cock is kept down by the ſcrew L, and held up by the gibbet DL. The handle turned from K to *k*, admits a paſſage to the ſteam into the copper receiver A.

This receiver A communicates at bottom with the ſuction-pipe ZH going down to the water H in the well X; and above, with the forcing pipe EE, which goes up a little above the water of the reſervoir R; between theſe two pipes are two valves F and G, both opening upwards. The ſteam being let in upon the water of the receiver A, forces it up the valve F, and the pipe EE, to the reſervoir, and then the ſaid receiver is full of hot ſteam.

This ſteam, in the receiver, is condenſed by a jet of cold water coming from the forcing-pipe, by the ſmall pipe MI, being let in and ſhut off by the cock at M. The ſteam being condenſed by this jet, will be reduced to a very ſmall ſpace, and ſo make a vacuum: upon which the water in the well will ruſh up the forcing-pipe to reſtore the æquilibrium, and thus again fill the receiver A; the little air being compreſſed within a ſmall compaſs at the top above *a b*.

That there may be always water in the force-pipe for the jet, there is a little pipe which brings the water to it from the reſervoir, with the ſmall ſtop-cock Y to ſhut it off upon occaſion. The valves at F and G are examined at any time, by unſcrewing the pin 1 to looſen the ſtrap 2, and let down the flanch 3; all which parts are ſhewn larger in *fig.* 2.

By the particular contrivance of the cock at DI, and its key, the water is made to paſs from the force-pipe to the boiler, to ſupply the waſte in ſteam. This is plainly ſhewn in the ſection of the cock and key, where 5 is the top of the key; 6 is a hole on one ſide, which goes down to the bottom to convey the ſteam or jet of water alternately to the receiver; 7 is a notch on the other ſide, to take in the water from the force-pipe, and conduct it to the boiler B. How this is done is eaſy to conceive from a view of the two ſections of the cock and key in two poſitions within it.

The boiler may hold five or ſix hogſheads, and the receiver one hogſhead per hour. This ſteam makes a vacuum ſo effectually, as to raiſe water from the well to the height of 29 or 30 feet; and ſuppoſe the ſteam able to lift up the ſteelyard, with its weight hanging at the ſixth diviſion, it will then be able to raiſe a column of water about 50 yards high, as being then ſix times ſtronger than the preſſure of the air, as is eaſily underſtood from what has been ſaid under ENGINE *for extinguiſhing Fires*, the water being raiſed in a ſimilar manner in both machines; there by the preſſure of condenſed elaſtic air, and here by the preſſure of rarefied elaſtic ſteam.

The elaſticity of the ſteam increaſing with its heat, and the ſpace, into which it endeavours to expand itſelf, being as its elaſticity or ſtrength, and ſince we know that water expanded into vapour, of the ſame ſtrength of the air, occupies near 3000 times the ſpace as before, it follows, that, when the ſteam has twice that ſtrength, it will be expanded into 6000; if it be five times as ſtrong as the air's ſpring, it will become expanded into 15000 times that ſpace, and ſo on, beyond the reach of experiments; from all which it appears, how near a perfect vacuum we may approach by this engine, or any other, by means of rarified vapours.

The following engine, which was invented by Mr. De Moura of Portugal, F. R. S. is an improvement of that above deſcribed, as it is rendered capable of working itſelf.

This engine conſiſts in a receiver, a ſteam, and an injection-cock; a ſuction and a forcing-pipe, each furniſhed with a valve; together with a boiler, which, on account of its bulk and weight, was not ſent with the reſt; but, as it may be of the common globular ſhape, and having nothing particular in its conſtruction, a deſcription of it will not be neceſſary; as alſo, the reſt of theſe parts already mentioned being eſſential to every machine of this kind, a farther account of them may be diſpenſed with. What is peculiar to this engine, is a float within the receiver, compoſed of a light ball of copper, which is not looſe therein, but faſtened to the end of an arm, which is made to riſe and fall by the float, while the other end of the arm is faſtened to an axis; and conſequently, as the float moves up and down, the axis is turned round one way or the other. This axis is made conical, and paſſes through a conical ſocket; which laſt is ſoldered to the ſide of the receiver. Upon one of the ends of the axis, which projects beyond the ſocket, is fitted a ſecond arm, which is alſo moved backward and forward by the axis, as the float riſes and falls. By theſe means, the riſing and falling of the ſurface of the water within the receiver communicates a correſpondent motion to the outſide, in order to give proper motions to the reſt of the geer, which regulates the opening and ſhutting of the ſteam and injection-cocks; and ſerves the ſame purpoſe as the plug-frame, &c. in Newcomen's engine. The particular conſtruction and relation of thoſe pieces will better appear by the figure and references, than can be done by a general deſcription.

A B, (*fig.* 1.) an arm, which is faſtened to *a b*, a conical axis, which goes through a conical ſocket in C, a triangular piece ſoldered to the receiver. This piece has this ſhape to give liberty to the arm to riſe and fall, that carries the float on the inſide. D E is a ſmall ciſtern ſoldered to the receiver, which, being kept full of water, keeps the axis and ſocket air-tight. This ciſtern is conſtantly kept full of water, by means of a ſmall leakage through the wooden peg *c*, which follows the packthread *e d* to the ciſtern.

e is a ſmall weight to counterpoiſe the float within.

f, is a ſlider, which being ſet nearer to, or farther from, the axis, will riſe or fall a greater or leſſer ſpace, as may be required; and is faſtened by the ſcrew *g*. This ſlider is furniſhed with a turn-about, *h i*, which is alſo faſtened by a ſcrew, and not at the end *i*, and ſerves to adjuſt the length of F G G H, a chain, which gives motion, by means of the ſhorter chain *k l*, to I K L, the balance, which opens and ſhuts the cocks; and moves upon the ſmall axis L.

G, G, are two pullies ſupported by two arms that are faſtened to the ſide of the receiver, and give the chain a proper direction in order to move the balance.

M N is the ſteam-cock; the end N being ſuppoſed to be detached from a pipe that gives it communication with the boiler.

O is the injection-cock, whoſe key is turned by the arm O *m*.

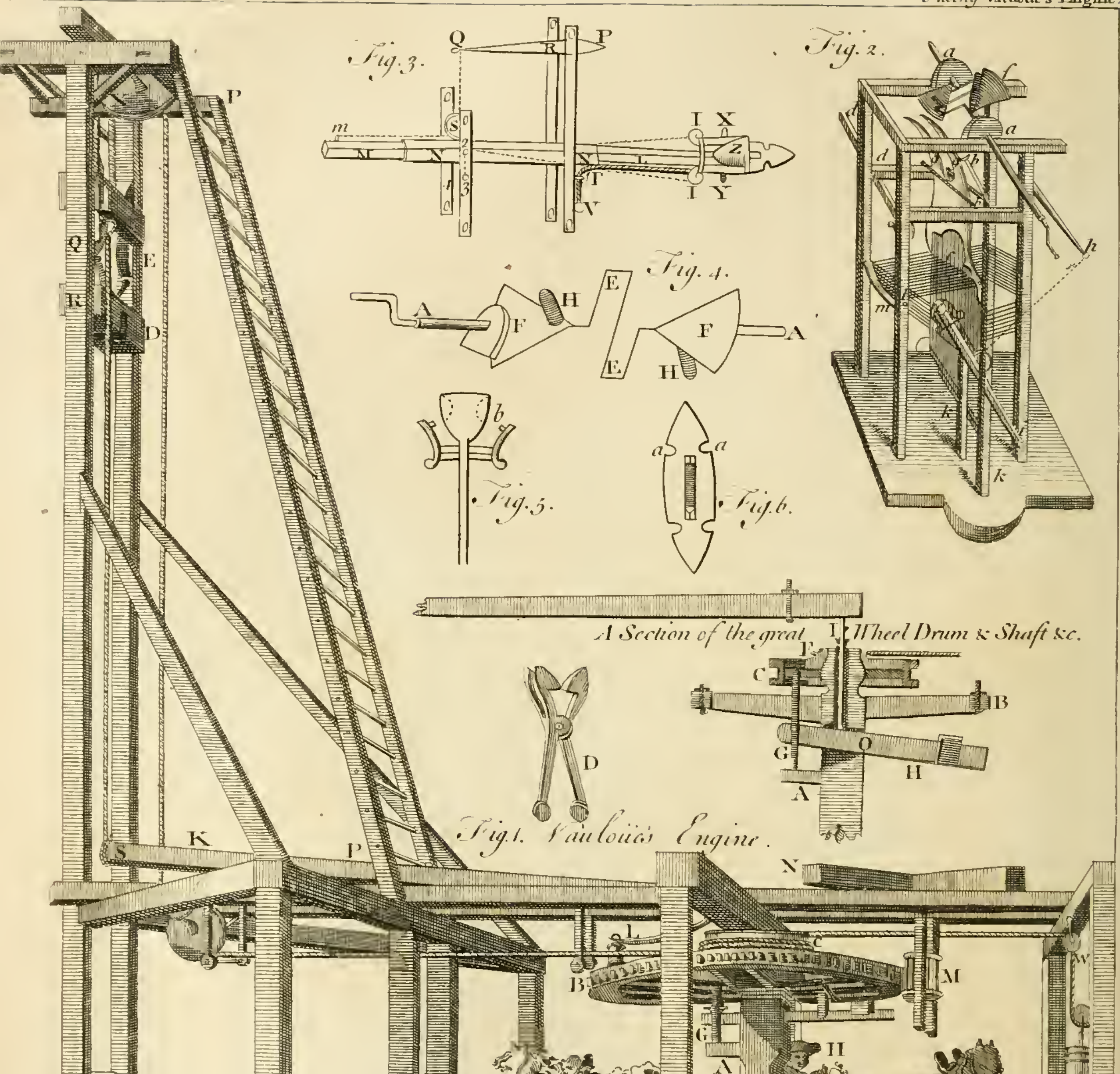
P Q is the injection-pipe, communicating between the forcing-pipe above the valve, and the top of the receiver.

R S is the arm by which the key of the ſteam-cock is worked.

I, K, two rollers annexed to the balance, which is furniſhed with two ſmall rollers, *n*, *o*, which open and ſhut the injection-pipe, by acting upon the arm O *m*, in ſuch a manner, that when the ſteam-cock is opened, the injection is ſhut, and *vice verſa*.

T is

ATE LI. Facing Vauloüe's Engine.



J. Lodge Sculp.

T is a bell of advice, which, moving along with the balance, continues to ring as long as the engine is at work.

V is a cock which ſerves to diſcharge the air from the receiver, and is opened by hand when neceſſary.

W is a weight ſufficient to raiſe the balance to a perpendicular poſture, when it is inclined to the right, and alſo to overcome the friction of the float, axis, pullies, chain, &c.

To put the engine in motion, preſs down the arm A B, which will bring the balance over to the right ſide, and in its motion will open the ſteam-cock, and ſhut the injection; ſet open the cock at V, that the air may be diſcharged by the entrance of the ſteam into the receiver. This being done, ſhut that cock, and let go the arm; the weight W will bring over the balance to the left, and in its motion ſhut the ſteam-cock, and open the injection; this preſently condenſing the ſteam into water, in a great meaſure, leaves a vacuum in the receiver. Things remain in this ſituation, till the preſſure of the atmoſphere has cauſed the water to mount through the ſuction-pipe into the receiver, where, as its ſurface riſes, it cauſes the float to aſcend; and, depreſſing the arm A B, raiſes the balance till it has paſſed the perpendicular; and in its deſcent, which is done by its own gravity, the roller K lays hold of the arm R S, again opens the ſteam cock, and ſhuts the injection. The receiver being now almoſt filled with water, the balance cannot return till the ſurface of the water therein ſubſides, and ſuffers the float to deſcend. This is performed by the elaſticity of the ſteam, which, at the ſame time that it fills the receiver, drives out the water through the forcing-pipe; and when the ſurface is deſcended ſo low as to ſuffer the weight W to bring the balance beyond the perpendicular towards the left, it then falls of its own accord, and, in falling, the roller I lays hold of the arm R S, ſhuts the ſteam-cock, and opens the injection as above.

When the engine is deſired to be ſtopped, obſerve, when the balance lies to the right, to turn round the arm O *m* of the injection-cock, ſo that the tail of the ſteam-cock may miſs it in the next motion; ſo that at the ſame time that the receiver is filled with ſteam, and the ſteam-cock ſhut, the injection not being opened, the motion will ſtop for want thereof.

In the Philoſophical Tranſactions, N°. 461, there is an account of an improvement made in the ſteam-engine by Mr. Paine, as follows: He has contrived two iron pots, or veſſels, of a conical form, inverted, as repreſented by A B E F (*fig.* 4.) on the upper part of which is fixed a round globular copper-head, about five feet and a half in diameter, as L M N. There is then placed on the inſide a ſmall machine H, called the diſperſer, with ſpouts *a*, *b*, *c*, *d*, *e*, &c. round the ſides fixed to it, and the bottom thereof reſts on a center-pin O. In this machine is fixed an upright tube G, with holes at the bottom, and a funnel P on the top to receive a ſpout of water from a conduit-pipe Q, by the ſtop-cock R.

This veſſel being completed, two or more of them are placed in a reverbaratory arch for conveying the intenſe heat of a ſtrong fire, the flame of which encompaſſes the iron veſſels, and keeps them in a red heat during the time of their uſe; at which time the cog-wheel I, being turned by proper machines, whirls the diſperſer about with great velocity, and cauſes the water in it, by a centrifugal force, to fly through the ſpouts, againſt the ſides of the red-hot pots, which immediately convert the greateſt part thereof into vapour, or elaſtic ſteam, which is conveyed by a common pipe and cock to the barrel of the engine, to put the piſton in motion; and the waſte water is conveyed away at bottom, by means of a pipe at CD, with a valve at D to keep out the air.

Mr. Vouloüe's ENGINE, *invented for driving the Piles at Weſtminſter-Bridge.*

A (plate LI. *fig.* 1.) the great ſhaft on which are the great wheel and drum.

B The great wheel with cogs, that turns a trundle-head with a fly to prevent the horſes falling when the ram is diſcharched.

C The drum on which the great rope is wound.

D The follower, with a roller at one corner, in which are contained the tongs that take hold of the ram, and are faſtened to the other end of the great rope which paſſes over the pulley, near the upper end of the guides, between which the ram falls.

E The inclined planes which ſerve to open the tongs, and diſcharge the ram.

F The ſpiral barrel that is fixed to the drum, on which is wound a rope with a counterpoiſe, to hinder the follower from accelerating, when it falls down to take up the ram.

G The great bolt which locks the drum to the great wheel.

H The ſmall lever which has a weight fixed at one end, paſſes through the great ſhaft below the great wheel, and always tends to puſh the great wheel upwards, and locks the drum to the great wheel.

I The forcing bar, which paſſes through the hollow axis of the great ſhaft, and bears upon the ſmall lever, and has near the upper end a catch, by which the crooked lever keeps it down.

K The great lever which preſſes down the forcing-bar and diſcharges the great bolt, at the time the long end is lifted up by the follower.

L The crooked lever, one end of which has a roller, which is preſſed upon by the great rope; the other end bears upon the catch of the forcing-bar, during the time the follower is deſcending.

M The ſpring that preſſes againſt the crooked lever, and diſcharges it from the catch of the forcing-bar, as ſoon as the great rope ſlackens and gives liberty to the ſmall lever to puſh up the bolt.

By the horſe going round, the great rope is wound about the drum, and the ram is drawn up till the tongs come between the inclined planes, when they are opened, and the ram is diſcharged.

Immediately after the ram is diſcharged, the roller which is at one end of the follower, takes hold of the rope that is faſtened to the long end of the great lever, and lifts it up; the other end preſſes down the forcing-bar, unlocks the drum, and the follower comes down by its own weight.

As ſoon as the follower touches the ram, the great rope ſlackens, and the ſpring M diſcharges the crooked lever from the catch of the forcing-bar, and gives liberty to the ſmall lever to puſh up the great bolt, and to lock the drum to the great wheel, and the ram is drawn up again as before.

Weaving Engine, a machine which may be worked either by wind, water, or a boy or man turning a winch. It is compoſed of four principal parts; 1ſt. The ſerpent *a a* (plate LI. *fig.* 2.) 2d. The treddles *b b*. 3d. The clapper *c*: and 4thly, the arms *d d d d*.

The ſerpent is made like the ordinary crank, and by its revolution gives motion to all the moveable parts of the engine. The treddles differ in nothing from the treddles in the common loom, only as they are worked by cords. The clapper *c* is ſupported between two rails by a cord double twiſted, which gives it a ſpring, and when drawn back by the quadrant of the ſerpent that hitches in the curved teeth *g g*, cauſes it to fly forwards with a vibratory motion, and ſo to beat up the cloth. The arms *d d d d*, and their manner of working, is as follows; *b* is the end of the trigger, to which a cord is faſtened which paſſes through a pulley, and terminates at *i*; *k k* are the weights that draw back the arms; *l* is the hole in which one end of the beam turns; *m* is the web. Fig. 3. ſhews the manner of conveying the ſhuttle; N N is a hollow pipe ſlit underneath, through which the arm L M paſſes to and fro; O O O O are the ſupporters. The motion is formed thus: P Q is a kind of trigger, which, though unequally divided by its ſupporter R, is yet in equilibrio, the end P R being made to weigh exactly as much as R Q. To the end Q of this trigger is tied a cord, which paſſing through the pulley S, terminates at the extremity of the arm, and is faſtened to the little button *m*. At the other extremity of the ſame arm, to wit, at I I, a cord is alſo tied, which by means of the ſlit underneath, paſſes through the pulley 2, and ſupports the weight 3. At the ſame end of the arm the box Z, about half the bigneſs of the ſhuttle, is fixed, which is encloſed between two little pieces of wood, having at one end of them two teeth Y Z, and at the other a ſmall whalebone, or ſteel ſpring, which naturally enclines the teeth to cloſe, and enter the niches on each ſide the ſhuttle, through holes in the box left for that purpoſe. Acroſs the points I I there goes another cord, which paſſes through the pulley T, and carries the weight V. This arm thus diſpoſed, goes and comes in the hollow pipe N N, in the following manner: one tooth of the ſerpent is ſo contrived as, in turning, to preſs down the end of the trigger P, and ſo cauſes the end Q to riſe, which drawing in the cord faſtened to the button *m*, makes the arm L M to advance forward; but when the tooth is paſſed by, then the weight 3, faſtened as already ſaid, draws it back again. When the arm is in its natural ſtate, the two little pieces of wood encloſe the ſhuttle by means of the whalebone ſpring, but when the arm in motion approaches to its oppoſite, then the cord tied acroſs at I I, being a little too ſhort, and the weight V, not being able to paſs through the pulley T, the ſpring is by this means bent back, and the teeth opened to diſcharge the ſhuttle, which is immediately received, and graſped by the other arm, and ſo alternately.

Fig. 4. is the ſerpent; A A the handle; H H the teeth that preſs down the trigger; F F the quadrants that work the clapper, as is ſhewn in the plate; and E E are the elbows, to which the cords are fixed that raiſe and lower the treddles, as in a common loom.

Fig. 5. is the box, ſprings, pieces of wood, and teeth *b b*, that encloſe the ſhuttle, repreſented as opened to diſcharge it.

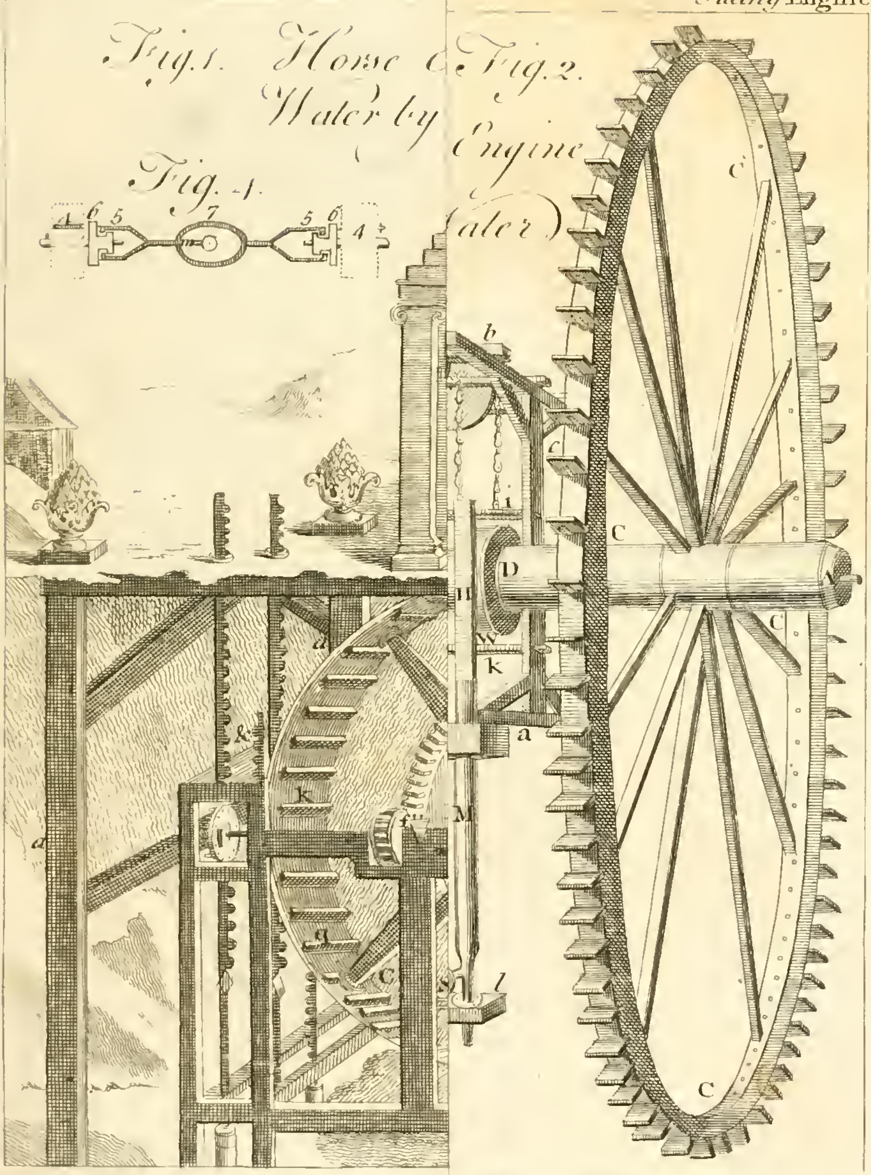
Fig. 6. is the ſhuttle with its niches *a a*.

Engine *for raiſing Water by Horſe*. Mr. Walter Churchman gives the following account (of one he invented) to the Royal Society:

1. In this engine the horſes, or other animals, draw horizontally, in a ſtraight line and at right angles, whereby they exert their utmoſt force; by which means, far greater power is gained from the ſtrength of the horſes, &c. than by their going round in a circle: for, by the twiſt and acuteneſs of the angles, they draw in towards the center, whereby they waſte their power, and likewiſe ſhorten their levers; beſides, their muſcles and tendons from their hinder legs all along their ſides to their necks are unequally ſtrained, as the duty is hardeſt on one ſide, even though their walk be large: therefore, each of thoſe inconveniences muſt be attended with pain to the animals when at work, and with a great loſs of their ſtrength.

2. A crank does not riſe quite $\frac{1}{3}$ of its circle, neither do the regulators or rods, riſe or fall perpendicular, but obliquely, whereby an oval figure is formed by the piſtons motion in every cylinder, which occaſions great friction and a waſte of water, and every arm is continually varying in its power while working; as its lever is diſtant from the perpendicular line, and two of the arms (ſuppoſing it a qua-

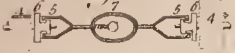
PLATE LII. Facing Engine.



J. Lodge sculp.

Fig. 1. Horse Engine for ye Raising Water by Mr. Churchman.

Fig. 4



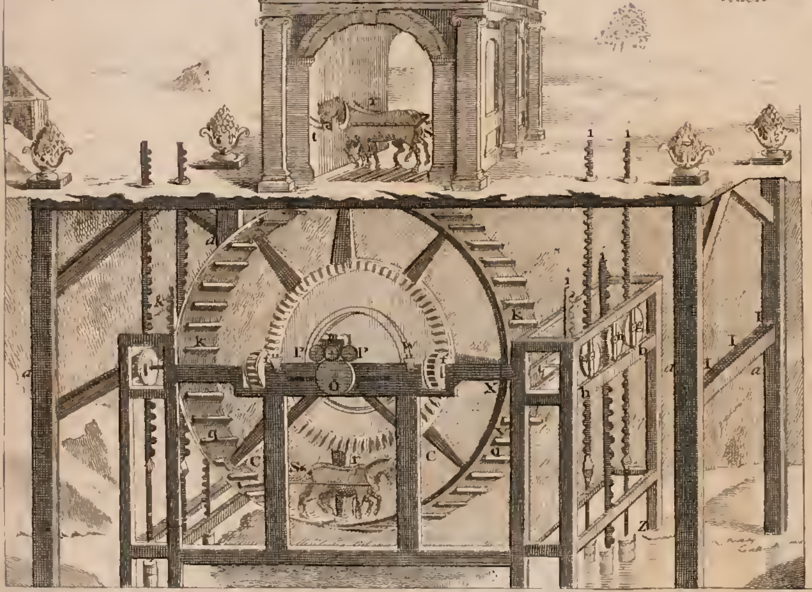


Fig. 3.

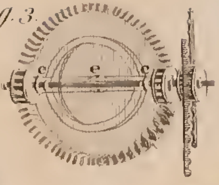
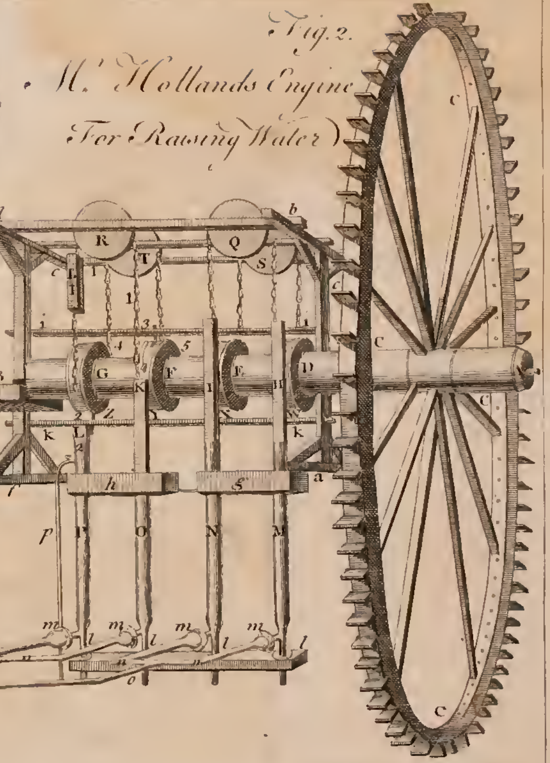


Fig. 2.

Mr. Hollands Engine For Raising Water



J. Lodge sculp.

quadruple one) as they croſs the perpendicular, are always drawing to and from their own center, by which the power is not only loſt, but the time alſo. Farther, by the ſhortneſs of the ſtrokes, all the adjacent water is frequently moved contrarily, and by the often opening and ſhutting of the valves, there is alſo a great waſte of the water, beſides the many heavy bearings, frictions, ſurges, and repairs, belonging to it; all which inconveniencies and impediments being thoroughly conſidered, there muſt certainly be required a much greater power to work the ſame than by Mr. Churchman's method, for thereby a ſtroke of twenty-four feet will riſe; and by enlarging or diminiſhing the fixed wallower, you obtain a ſtroke of any required height, even to the extent of the preſſure of the atmoſphere: by this great advantage, the water riſes freer, and with greater velocity; and as the lifters or forcers riſe and fall exactly perpendicular, and with an equal continued ſtrain, and as the bearings alſo are fewer and lighter, conſequently, the friction in all theſe will be a great deal leſs than with the crank, &c. And, laſtly, $\frac{7}{8}$ of that water which is always loſt by the ſlow opening and ſhutting of the valves will be ſaved.

From the above conſiderations, and by the ſeveral experiments Mr. Churchman made on this occaſion, in order to know the real differences between theſe different ways of working, he finds that near twice the quantity of water will be raiſed to the ſame height, in the ſame time, with the ſame power, by his method, than with the beſt crank-work that has hitherto been erected.

aaaa (plate LII. *fig.* 1.) repreſents the great frame, the ends of which under the pine-apples are to be contracted to the place of the little frame; ſo that the croſs piece at III may ſupport the three bearings, now ſhewn in the little one for a better view only; *bb* the little frame on which the cap-braſſes are, which receive the turned gudgeons T in the three horizontal ſhafts; *cc* the ſtrong ſupporters by the looſe wallowers; *dd* the looſe wallowers, whoſe turned rounds geer truly with the cogs in the great wheel; *eee* the regulator (*fig.* 3.) which has a circular, direct, and retrograde motion; *ff* the ſtrong ſhoulder or ſtud fixed to the ſhaft cloſe by the wallower, which ſtops this looſe wallower, when the end of the regulator comes againſt it, thereby confining it for two revolutions; after which it quits this ſtud, and does the ſame on the oppoſite ſide of the wheel; and ſo on alternately, to reverſe the motion of the ſtems in the different cylinders; *gg* the wheels, with their cogs, which alternately work the fixed wallower lying between them; *h* the fixed wallower, ſuppoſed to be four feet in diameter (on a very ſhort ſhaft) whoſe rounds muſt be of caſt ſoft iron, and truly turned, to elevate and depreſs the racks to the height of twenty-four feet by its two revolutions; *iiii* the four lifters or forcers, behind each of which muſt be a ſmall leverage back wheel, truly fitted to direct the ſame to riſe and fall equally and exactly perpendicular, to avoid friction and loſs of water in the cylinders; *kk* the large vertical wheel, a ſmall ſegment of which comes through the floor in the dome for the four horſes to ſtand and draw on; *lm* (*fig.* 4.) the arms and the main ſhaft of the ſame, the arms lie horizontal and the oval part is perpendicular; *n* the turned T gudgeon, with its collar and ſhoulder, both of which muſt claſp the limb of the under leverage wheel, to keep all firm and ſteady when in working; *o* the leverage wheel, about four feet in diameter, with a braſs or iron rim ſuppoſed to be truly turned, and to have a ſtrong ſhort iron ſpindle through its center, and at each end a turned ſteel collar and ſhoulder, bearing on two caſt cap-braſſes exactly level, and ſunk into a ſtrong arched piece of timber well braced and ſupported for this purpoſe. And here it is to be noted, that in large engines and machines, where the motions are regular, every heavy bearing ſhould have one of theſe wheels, for they ſave power by greatly abating friction. Upon the principle of theſe leverage-wheels, captain Rowe has publiſhed what he calls his friction-wheels, though ſubſequent to Mr. Churchman's ſpecification thereof; *pp* two ſmall ſide leverage-wheels, exactly fitted to the turned part of the great gudgeon, between the collar and ſhoulder; they are to be placed and keyed in ſuch manner, that their friction from the gudgeon may be alike when at work; *qq* the ſteps which the horſes feet preſs, about eight or nine inches broad, two inches thick behind, and declining to an edge, being deſigned to make level ground and good footing for their hinder legs when they draw; *rr* four horſes only in view to avoid confuſion, all drawing horizontally in a ſtraight line, and at right angles, whereby theſe uſeful animals will ſoon be taught a new and pleaſant way of working to themſelves, a more advantageous one to their maſters, and of greater utility to the public; *s* the faſtening places behind the horſes, ſuppoſed to be ſtrong arms below in the ſupporter, and a croſs bar above, at both which you may place ſmall ſheeves or rollers, the upper part of them to be level with each horſe's breaſt, when drawing, and the rope or ſtrap to come over the ſame, in order to keep a weight of 300 ℔. (more or leſs) ſuſpended, one or two inches from a plank. By this method you will be exactly informed of the ſtrength of each horſe, how long it continues, and when to relieve him; as alſo when juſtly to correct the ſlothful one, whoſe weight reſting on the plank will always diſcover his lazineſs; *t* the faſtening places before, which are deſigned to direct their heads; *u* the dome, meerly for ornament; inſtead of which, erect a workloft, over that a horizontal windmil; on the lower end of its upright ſhaft fix a ſpur-wheel to work with the cogs of the great wheel, thereby to aſſiſt the horſes, or when there is a ſufficient force of wind to do their whole duty; *w* the coupling ſtaples with the braſſes; *x* the ſtrong catch which confines the great wheel to the frame; *y* the ſcrew or kay-band, to confine all cloſe and tight; *z* the cylinders which are ſcrewed together at their ends out of ſight; and all the ſame ſort of work chiefly for uniformity in the draught.

In plate LII. *fig.* 2. you have a view of Mr. Holland's engine, at lord Tilney's, for raiſing water; the deſcription is as follows:

A B, the ſhaft or axle-tree of the engine, 24 feet long, and 24 inches diameter.

C C C C, an underſhot water-wheel, 30 feet diameter; its ladles 18 inches broad, and 12 deep; the fall ſeven feet.

D E F G, four moveable rings or collars, placed on the ſhaft, three feet diameter, ſix inches broad.

H I K L, four forcers, riſing and falling alternately, by means of thoſe collars, having four chains faſtened to the collars and the tops of the forcers, as repreſented at W X Y Z. The forcer L is cut off, to ſhew the chain more diſtinct. As the collar G moves (with the wheel and axis) half round towards you, the chain z, fixed at one end to the lower part of the collar G at 2, at its other end at the top of the forcer L 1, will pull down the forcer L 1 four feet and a half; and, at the ſame time, a chain I, fixed to the head of the forcer L 1, and to the head K, pulls up the forcer K four feet and a half; by which time the collar G will have carried its trigger 2 up to the bar *i i*, which will unlock its trigger; and the trigger 3, in the collar F, will be brought backward down to Y, and there lock the collar F. Then, the motion continuing, K will be depreſſed four feet and a half, and the chain I I, over the pulley R, will raiſe L four feet and a half. And thus the two forcers and collars continue riſing and falling, moving forwards and backwards, locking and unlocking alternately.

And, in like manner, the other two collars, D and E, move with their forcers, H and I.

But, to prevent one collar's moving the backward way, faſter than the other moves forwards, there is a gauge-chain 4, fixed to the callar G, paſſing over another pulley T, to the collar F at 5, which regulates their motions. Theſe chains are lengthened or ſhortened by ſcrews, as occaſion requires.

M N O P, are four braſs cylinders, or pumps, ſeven feet long; the bores of M and N are ſix inches diameter, and thoſe of O and P ſeven inches and one quarter; having, at *l l l l*, each a valve below, which are for taking in the water; and, at *m m m m*, valves in the horizontal parts.

The branches *m n*, *m n*, *m n*, *m n*, communicate the water of their two forcers by *n n*, *n n*, and ſo it to two pipes, *o n*. Theſe two pipes, *o n*, join together, at a ſmall diſtance beyond what is repreſented on the plate, ſo that the whole water is forced along one pipe; which makes a jet d'eau of ſeventy feet, and raiſes the water to the houſe above ſeventy feet perpendicular.

Ninety-five hogſheads are forced up, per hour, to the jet d'eau, and forty-ſeven to the garden.

g, *h*, are two ciſterns, ſupplied by a pipe *p*, to keep the forcers or piſtons always wet.

a b c d e f, is a frame of wood to carry the pullies Q R S T, and the bars *i i*, and *k k*.

The water-wheel goes about five times per minute to force the water to the houſe; and three, when the water is raiſed eighty feet to the gardens.

One turn of the wheel makes four ſtrokes, viz. each forcer one; A is ſix inches bore, and therefore holds

In $4\frac{1}{2}$ feet — 4.5 gallons
$7\frac{1}{4}$ —— 8.0
——
12.5
12.5
——
One revolution of the wheel —— } 25.0
Times per minute 4
——
100.0
60 gallons per hour
——
63)6000.0(95.3 hogſheads per hour.

The half of which is 47.6 nearly.

The method of raiſing and falling the forcers in this engine is new, and finely contrived.

The locks and collars are ſo curiouſly formed, and the chains ſo nicely adjuſted, that there is little or no ſhock at the taking or leaving, which engines of this kind are too often ſubject to.

Self-moving ENGINE, a machine invented by a Poliſh Jeſuit; it conſiſts of a pump, whoſe body *a b f g* (plate LIII. *fig.* 1.) is a palm and two fingers breadth in diameter, and four palms in height; the head *d e f g* is a palm in height; the cylinder *a b d e* of the body of the pump is two palms and a half in height, of which the piſton *c c* fills up one palm; the other palm and half muſt hold at leaſt five cans of water, each containing three quarts.

The wooden pipe from *f g* to the horizontal pipe *n n* is about thirty-two palms in vertical height.

The author obſerves, that if the diameter of the mouth of the pipe *h n* be equal to that of the cavity of the pump, and the diameter of the iron rod *h k* be of ſuch ſize as that the pipe *f g n* ſhall contain only ſeventeen cans of water, the machine will be the eaſier worked, as the water being forced through a paſſage leſs ſtraight meets with leſs reſiſtance.

The diameter of the hole *f g* muſt be equal to half the diameter *d e* of the body of the pump, whence it will be four times ſtraighter than the body of the pump, becauſe circles are to one another as the ſquares of their diameters.

The machine works in the following manner: The piſton *cc* being at the bottom of the pump, the ſuckers, both of the pump and of the piſton, ſhut by their own weight; whence, by the deſcent of the bucket *p*, the wheel *mm*, ſix feet in diameter, is turned, by which means the chain *kz*, by paſſing round the axis *ll* of the wheel, raiſes the iron rod *kh*, and the piſton *cc*, at which inſtant the ſucker of the pump opens, and gives paſſage to the water, which is forced into the body of the pump by the weight of the external air; then the counterpoiſe *v* deſcends, and ſo turns the wheel *mm*, round which goes the cord *mmo*, which, deſcending on the other ſide, raiſes the bucket.

In proportion as the counterpoiſe *v* deſcends, and the bucket *p* is raiſed, the axle of the great wheel is freed from the twiſtings of the cord, and ſo the piſton, by its own weight, and that of the iron rod, falls down to the bottom of the body of the pump, and by that means the ſucker of the pump ſhuts, and the five cans of water mount up through the piſton by its ſucker, which opens above. The ſame operation is readily performed again, in order to carry that water into the pipe *fgnni*, whence it is diſcharged through the horizontal pipe *nn* into the baſon, which holds at leaſt thirty-two pounds of water. This water falls into the bucket *p*, through the pipe *qr*, whoſe clap opens (being raiſed by two croſs ſticks which are faſtened to the cord) and lift up the bar *oy*.

The bucket *p* contains four cans and a half of water; it is two palms in length, ten at the opening, and ſix inches in depth, when the two long faces uniting, form an angle of 120 degrees; being thus filled, it deſcends apace, and the bar *no* being depreſſed, the clap falls and cloſes the pipe *qr*; and as it deſcends thirty feet, and the great wheel is ten feet in diameter, it makes an entire revolution; thus the axis *ll* twiſting up the chain *kz*, the rod *kh* raiſes anew the piſton *c*, and carries again at leaſt four cans and a half of water into the baſon *nq* through the horizontal pipe *nn*.

The bucket, when deſcended almoſt to the ſurface of the water of the well, is raiſed again by means of the cord *st* which is too ſhort to reach the water, and being for the preſent diſcharged of its weight, the piſton deſcends to the bottom of the pump by its own weight and that of the rod *hk*, and the croſs ſtick *so* of the cord of the bucket coming under the bar *oy*, raiſes it, together with the clap, that the water of the baſon *nq* may fall again thro' the pipe *qr* into the bucket *p*, cauſing it to deſcend anew, and ſo maintain a perpetual motion.

There are ſeveral other ſmall pieces in this engine, the uſe of which is eaſily comprehended by the figure.

ENGINEER, or INGINEER, properly ſignifies one ſkilled in the nature of engines in general; but it is commonly applied to an officer who is appointed to inſpect and contrive any attacks, defences, &c. of a fortified place.

ENGLISH, or the ENGLISH-TONGUE, the language ſpoken by the people of England, and, with ſome variation, by thoſe of Scotland, as well as part of Ireland, and the reſt of the Britiſh dominions.

The ancient language of Britain is generally allowed to have been the ſame with the Gaulic, or French; this iſland, in all probability, having been firſt peopled from Gallia, as both Cæſar and Tacitus affirm, and prove by many ſtrong and concluſive arguments; as by their religion, manners, cuſtoms, and the nearneſs of their ſituation. But now we have very ſmall remains of the ancient Britiſh tongue, except in Wales, Cornwall, the iſlands and highlands of Scotland, part of Ireland, and ſome provinces of France; which will not appear ſtrange, when what follows is conſidered.

Julius Cæſar, ſome time before the birth of our Saviour, made a deſcent upon Britain, though he may be ſaid rather to have diſcovered than conquered it; but, about the year of Chriſt forty-five, in the time of Claudius, Aulus Plautius was ſent over with ſome Roman forces, by whom two kings of the Britons, Codigunus and Caractacus, were both overcome in battle: whereupon a Roman colony was planted at Malden in Eſſex, and the ſouthern parts of the iſland were reduced to the form of a Roman province: after that, the iſland was conquered as far north as the Firths of Dumbarton and Edinburgh, by Agricola, in the time of Domitian; whereupon a great number of the Britons, in the conquered part of the iſland, retired to the weſt part, called Wales, carrying their language with them.

The greateſt part of Britain being thus become a Roman province, the Roman legions, who reſided in Britain for above two hundred years, undoubtedly diſſeminated the Latin tongue; and the people being afterwards governed by laws written in Latin, muſt neceſſarily make a mixture of languages. This ſeems to have been the firſt mutation the language of Britain ſuffered.

Thus the Britiſh tongue continued, for ſome time, mixed with the provincial Latin, till, the Roman legions being called home, the Scots and Picts took the opportunity to attack and harraſs England: upon which, king Vortigern, about the year 440, called the Saxons to his aſſiſtance, who came over with ſeveral of their neighbours, and having repulſed the Scots and Picts, were rewarded for their ſervices with the iſle of Thanet, and the whole county of Kent: but growing too powerful, and not being contented with their allotment, diſpoſſeſſed the inhabitants of all the country on this ſide of the ſevern: thus the Britiſh tongue was in a great meaſure deſtroyed, and the Saxon introduced in its ſtead.

In the beginning of the ninth century, the Danes invaded England, and getting a footing in the northern and eaſtern parts of the country, their power gradually increaſed, and they became ſole maſters of it in about two hundred years. By this means the ancient Britiſh obtained a tincture of the Daniſh language; but their government, being of no long continuance, did not make ſo great an alteration in the Anglo-Saxon, as the next revolution, when the whole land, in the year 1067, was ſubdued by William the Conqueror, duke of Normandy in France: for the Normans, as a monument of their conqueſt, endeavoured to make their language as generally received as their commands, and thereby rendered the Britiſh language an entire medley.

Thus was the ancient Britiſh language, in a manner, extirpated by the Romans, Danes, and Saxons, and ſucceeded by the Saxon, and after that blended with the Norman French. But, beſides theſe, a change in the language has been effected by two other cauſes. The firſt is that of commerce; for as the inhabitants of Great-Britain have been for a long ſeries of years greatly addicted to trade, the names of offices, dignities, names of wares, and terms of traffic, have been introduced, and formed according to the genius of our own tongue. The ſecond is that of learning, from which our tongue has received no ſmall improvement; for, as to the Greek and Latin, the learned have, together with the arts and ſciences, now rendered familiar among us, introduced abundance, nay almoſt all the terms of art in the mathematics, philoſophy, phyſic, and anatomy; and we have entertained many more from the Latin, French, &c. for the ſake of neatneſs and elegancy: ſo that, at this day, our language, which, about 1800 years ago, was the ancient Britiſh, or Welſh, &c. is now a mixture of Saxon, Teutonic, Dutch, Daniſh, Norman, and modern French, embelliſhed with Greek and Latin. Yet this, in our opinion, is ſo far from being a diſadvantage to the Engliſh tongue, as now ſpoke (for all languages have undergone changes, and do continually participate with each other) that it has ſo enriched it, as now to become the moſt copious, ſignificant, fluent, courteous, amorous, and maſculine language in Europe, if not in the world: this, indeed, was Camden's opinion of it in his time, and Dr. Heylin's in his time: if then the Engliſh tongue, in the opinion of theſe learned authors, deſerved ſuch a character in their days, how much more now, having ſince received ſo conſiderable improvements from ſo many celebrated writers.

ENGRAFTING, or GRAFTING, in gardening. See GRAFTING.

ENGRAILED, or INGRAILED, in heraldry, a term derived from the French, *greſly*, hail; and ſignifying a thing the hail has fallen upon and broke off the hedges, leaving them ragged, or with half rounds, or ſemi-circles, ſtruck out of their edges.

ENGRAVING, the art of cutting on wood, metals, precious ſtones, &c. figures, landſcapes, letters, &c.

ENGRAVING *on Wood*. See the article CUTTING *in Wood*.

ENGRAVING *on Copper*, the making, correſpondently to ſome delineated figure or deſign, ſuch concave lines, on a ſmooth ſurface of copper, either by cutting or corroſion, as render it capable, when charged properly with any coloured fluid, of imparting by compreſſion an exact repreſentation of the figure or deſign to any fit ground of paper or parchment.

The method by which engraving is at this time performed, is of three kinds: by the graver or tool alone, which is in common language the only kind called engraving: by corroſion with aqua-fortis, which is generally called etching: and by covering the ſurface of a copper-plate with lines, in ſuch manner, that the whole would produce the effect of black in an impreſſion; and then ſcraping or burniſhing away part of the lines, ſo as to cauſe the remainder to have the ſame effect as if they had been cut on the even ſurface, according to the delineation of any figure or deſign; which laſt kind is called ſcraping in mezzotinto. See ETCHING and MEZZOTINTO.

Engraving with the tool was the kind originally practiſed, and it is yet retained for many purpoſes. For though the manœuvre of etching be more eaſy, and other advantages attend it, yet where great regularity and exactneſs of the ſtroke or lines are required, the working with the graver is much more effectual; on which account it is more ſuitable to the preciſion neceſſary in the execution of portraits; as there every thing the moſt minute muſt be made out and expreſſed, according to the original ſubject, without any licence to the fancy of the deſigner in deviating from it, or varying the effect either by that maſterly negligence and ſimplicity in ſome parts, or thoſe bold ſallies of the imagination and hand in others, which give ſpirit and force to hiſtory painting.

ENGRAVING *on precious Stones*, is the repreſenting of figures, or devices, in relievo, or indented, on divers kinds of hard poliſhed ſtones.

In this branch of engraving, they make uſe either of the diamond, or emery.—The diamond, which is the hardeſt, and moſt perfect of all precious ſtones, is only cut by itſelf, or with its own matter. See DIAMOND.

As to rubies, emeralds, hyacinths, amethyſts, garnets, agats, and other of the ſofter ſtones, they are cut on a leaden wheel, moiſtened with emery and water; and poliſhed with tripoli, on a pewter-wheel. Lapis, opal, &c. are poliſhed on a wooden wheel.

To faſhion and engrave vaſes of agat, cryſtal, lapis, or the like, they have a kind of lathe, like that of the pewterers, excepting, that whereas the latter is to hold the veſſels which are to be wrought with proper tools; the former generally holds the tools, which are turned by a wheel, and the veſſel held to them to be cut and engraved, either in relievo, or otherwiſe; remembering, from time to time, to moiſten the tools with diamond duſt and oil, or at leaſt emery and water.

To engrave figures or devices on any of theſe ſtones, when poliſhed, ſuch as medals, ſeals, &c. they uſe a little iron wheel, the two ends of whoſe axes are received within two pieces of iron placed upright, as in the turner's lathe, to be brought cloſer, or ſet farther apart, at pleaſure. At one end of one of the axes are fitted the proper tools, being kept tight by a ſcrew. Laſtly, the wheel is turned by the foot, and the ſtone applied by the hand to the tool; and thus ſhifted and conducted, as occaſion requires.

The tools are generally of iron, ſometimes of braſs. As to their form it is various, but generally bears ſome reſemblance to chiſſels, gouges, &c. ſome have ſmall round heads like buttons, others like ferrels, to take the pieces out; others flat, &c. Theſe tools are not applied directly againſt the ſtone, but, as it were, ſidewiſe; thus wearing, and, as it were, grinding off the ſubſtance: and ſtill, whether it be figures, or letters, or characters, the manner of application is the ſame. The tools, as above obſerved, are to be frequently moiſtened with diamond duſt, and oil of olives. When the ſtone is engraven, they poliſh it on a wheel of bruſhes, made of hogs briſtles, with tripoli. For the larger and leſs delicate works, they have copper or pewter tools on purpoſe to poliſh the ground, or plain parts, with tripoli, &c. which they apply after the ſame manner as thoſe wherewith the graving is performed.

Engraving *on Steel* is chiefly employed in cutting punches for coins, medals, &c.

The methods of engraving, with the inſtruments, &c. are the ſame for coins, as for medals and counters: all the difference conſiſts in their greater or leſs relievo; the relievo of coins being much leſs conſiderable than that of medals; and that of counters ſtill leſs than that of coins.

The engraver in ſteel uſually begins with punches, or punchions, which are in relievo, and ſerve for making the creux, or cavities of the matrices, and dies. Though, ſometimes, he begins immediately with the creux; but it is only when the intended work is to be cut very ſhallow. The firſt thing is to deſign his figures; then he moulds them in white wax, of the ſize and depth required; and from this wax he graves his punch.

This punch is a piece of ſteel, or at leaſt of iron and ſteel mixed; on which, before they temper or harden it, the intended figure, whether a head, or a reverſe, is cut, or carved in relievo. The inſtruments uſed in this graving in relievo, which are much the ſame as thoſe wherewith the finiſhing of the work in creux is effected, are of ſteel. The principal are gravers of divers kinds, chiſſels, flatters, &c. When the punch is finiſhed, they give it a very high temper, that it may the better bear the blows of the hammer, wherewith it is ſtruck, to give the impreſſion to the matrice.

What they call matrice, or matrix, is a piece of good ſteel of a cubic form, called alſo a die; whereon the relievo of the punch is ſtruck in creux. It is called matrix, becauſe, in the cavities or indentures thereof, the coins, or medals, ſeem formed, or generated, as animals are in the matrix of their mother. To ſoften this ſteel, that it may more eaſily take the impreſſions of the punch, they make it red hot; and, after ſtriking the punch thereon in this ſtate, they proceed to touch up or finiſh the ſtrokes and lines, where, by reaſon of their fineneſs, or the too great relievo, they are any thing defective, with ſome of the tools abovementioned.

The figure thus finiſhed, they proceed to engrave the reſt of the medal, as the mouldings of the border, the engrailed ring, letters, &c. all which, particularly the letters and graining (or engrailment) are performed with little ſteel punches, well tempered and very ſharp. And that, as they ſometimes make uſe of punchions to engrave the creux of the matrix, ſo, on ſome occaſions, they make uſe of the creux of the matrix to engrave the relievo of the punch.

To ſee and judge of the engraving in creux, divers means have been deviſed to take impreſſions therefrom as the work proceeds. Sometimes they make uſe of a compoſition of common wax, turpentine, and lamp black; which, always retaining its ſoftneſs, eaſily takes the impreſſion of the part of the graving it is applied to. But, this only ſerving to ſhew the work piece-meal, they have had recourſe to other ways, to ſhew the whole figure. The firſt, by pouring melted lead on a piece of paper, and clapping the matrix thereon: the ſecond, with melted ſulphur, managed the ſame way: and the third, proper only where the graving is ſhallow, by laying a piece of ſoft paper on the graving, and over the paper a leaf of lead, when, giving two or three blows with a hammer on the lead, the paper takes the impreſſion of the work.

When the matrix is quite finiſhed, they temper it, rub it well with pumice-ſtone, and clean out the ſtone again with a hair-bruſh; and, laſtly, poliſh it with oil and emery.

ENGUICHE, in heraldry, is ſaid of the great mouth of a hunting-horn, when its rim is of a different colour from that of the horn itſelf.

ENHARMONIC, in the ancient muſic, one of their genera or kinds of muſic, ſo called from its ſuperior excellence; though wherein it conſiſted, ſays Mr. Malcolm, is hard to ſay: it was allowed by all to be ſo very difficult, that few could ever practiſe it.

Others ſay, it is a ſpecies of muſic, the modulation whereof proceeds by intervals leſs than ſemitones; as the ſemitone minor, enharmonic dieſis, and third major.

ENIXUM, among chemiſts, a kind of neutral ſalt, generated of an acid and an alkali.

The ſal enixum of Paracelſus, is the caput mortuum of ſpirits of nitre with oil of vitriol, or what remains in the retort after the diſtillation of this ſpirit, being of a white colour, and pleaſing acid taſte.

ENMANCHE, in heraldry, is when lines are drawn from the center of the upper-edge of the chief to the ſides, to about half the breadth of the chief; ſignifying ſleeved, or reſembling a ſleeve, from the French *manche*.

ENNEAGON, in geometry, a figure conſiſting of nine angles, and as many ſides.

The word is derived from the Greek *εννεα*, nine, and *γονια*, an angle.

ENNEAHÆDRIA, in natural hiſtory, the name of a genus of ſpars.

The word is derived from the Greek *εννεα*, nine, and *εδρα*, a ſide.

The bodies of this genus are ſpars, compoſed of nine planes, in a triagonal column, terminated at each end by a triagonal pyramid.

ENNEANDRIA (from *εννεα*, nine, and *ανηρ*, male) the name of the ninth claſs in the Linnæan ſyſtem of botany, and comprehends thoſe plants whoſe flowers are hermaphrodite and furniſhed with nine ſtamina in each.

To this claſs belong the flowering ruſh, Braſillian-plumb, laurel, rhubarb, &c.

ENNERIS, in the naval architecture of the ancients, a galley or veſſel with nine tiers of oars. See the article Galley.

ENS, among metaphyſicians, denotes entity, being, or exiſtence: this the ſchools call *ens reale*, and *ens poſitivum*, to diſtinguiſh it from their *ens rationis*, which is only an imaginary thing, or exiſts only in the imagination.

Ens, among chemiſts, imports the power, virtue, and efficacy, which certain ſubſtances exert upon our bodies.

Ens Veneris, the ſublimate of equal quantities of dulcified calx of vitriol, and the dried flowers of ſal ammoniac, a ſmall proportion of which turns a large one of the infuſion of galls black: it is red, ſaline, and aſtringent, and ſaid to be an excellent medicine in diſtempers ariſing from a weakneſs of the ſolids, as the rickets, and the like.

ENSIFORM, in general, ſomething reſembling a ſword; thus we find mention of enſiform leaves, enſiform cartillage, &c.

The word is compounded of the Latin, *enſis*, a ſword, and *forma*, reſemblance.

ENSIGN, in the military art, a banner, under which the ſoldiers are ranged, according to the different companies or parties they belong to.

Ensign is alſo the officer that carries the colours, being the loweſt commiſſioned officer in a company of foot, ſurbordinate to the captain and lieutenant.

Ensign, in naval affairs, a ſort of banner or flag hoiſted on a pole called the enſign-ſtaff, over the ſtern of a ſhip.

It is uſed to diſtinguiſh the ſhips of different nations from one another, as alſo the different ſquadrons of a fleet from each other. See Flag and Signal.

ENTABLATURE, or Entablement, in architecture, is that part of an order of a column, which is over the capital, and comprehends the architrave, frieze, and corniche.

The entablature is alſo called the trabeation, and ſeems borrowed from the Latin, *trabs*, a beam; though others derive it from *tabulatum*, a ceiling, becauſe the frieze is ſuppoſed to be formed by the ends of the joiſts which bear upon the architrave.

It is different in different orders; for, notwithſtanding it conſiſts of the three before-mentioned diviſions in all, yet theſe parts are made up of more or fewer particular members or ſubdiviſions, according as the order is more or leſs rich. Vignola makes the entablature a quarter of the height of the whole column in all the orders. In the Tuſcan and Doric, the architrave, frieze, and corniche, are all the ſame height. In the Ionic, Corinthian, and Compoſite, the whole entablature being of fifteen parts, five of theſe go the architrave, four to the frieze, and ſix to the corniche. See the articles Tuscan, Doric, &c.

Entablature, in maſonry, is uſed ſometimes to denote the laſt row of ſtones on the top of the wall of a building, on which the timber and covering reſt. This is often made to project beyond the naked of the wall, to carry off the rain.

ENTAIL, in law, is a free eſtate intailed; that is, abridged and limited to certain conditions preſcribed by the donor or grantor. See the articles Fee, Recovery, and Tail.

ENTE, in heraldry, a method of marſhalling more frequent abroad than with us, and ſignifying grafted or ingrafted.

ENTELECHIA, *εντελεχεια*, a word uſed by Ariſtotle to expreſs the ſoul, and which, not accurring in any other author, has given the commentators upon that philoſopher great trouble to diſcover its true meaning.

ENTEROCELE, in ſurgery, is a kind of ſwelling, in which the inteſtine falls into the groin or ſcrotum.

The word is Greek, and derived from εντερον, an inteſtine, and κηλη, a hernia, tumour, or rupture.

ENTERO-EPIPLOCELE, in ſurgery, is a kind of rupture in which the inteſtines and omentum, or caul, fall down together into the ſcrotum.

The word is derived from the Greek εντερον, an inteſtine, and επιπλοον, the caul.

ENTERO-EPIPLOMPHALUS, in ſurgery, is a rupture cauſed by the inteſtine and caul falling down through the naval.

The word is formed from the Greek εντερον, a gut, επιπλοον, the caul, and ομφαλος, the navel.

This is a diſorder common to women with child.

ENTERO-HYDROMPHALUS, in ſurgery, is when the tumour is cauſed by the gut and water ſwelling out at the navel.

The word is formed from the Greek εντερον, a gut, υδωρ, water, and ομφαλος, the navel.

ENTEROLOGY, a treatiſe on the bowels, which generally includes the contents of the three cavities, the head, breaſt, and belly.

The word is Greek, and derived from εντερον, a gut, and λογος, a diſcourſe.

ENTERPLEADER, in law, ſignifies the diſcuſſing or trial of point, incidentally failing out, before the principal cauſe can be determined.

ENTERSOLE, in architecture, a kind of little ſtory, ſometimes called a mezanzine, contrived occaſionally at the top of the firſt ſtory, for the conveniency of a ward-robe, &c.

ENTERTAINMENT, in a theatrical ſenſe. See the article FARCE.

ENTHUSIASM, a tranſport of the mind, whereby it is led to think and imagine things in a ſublime, ſurpriſing, and yet probable manner.

The word is Greek, ενθεσιασμος, and derived from ενθυσιαζω, to be agitated with divine raptures.

ENTHUSIASM, in a religious ſenſe, implies a tranſport of the mind, whereby it fancies itſelf inſpired with ſome revelation, impulſe, &c. from heaven.

ENTHUSIAST, a perſon poſſeſſed with enthuſiaſm.

ENTHYMEME, ενθυμημα, among logicians, denotes a ſyllogiſm, perfect in mind, but imperfect in the expreſſion, by reaſon one of the propoſitions is ſuppreſſed, as being eaſily ſupplied by the underſtanding of thoſe with whom we diſcourſe: as for example, *Every man is mortal*; *therefore every king is mortal*; where the minor propoſition, *every king is a man*, is omitted, as being ſufficiently known.

There is a particular elegance in the enthymeme form of arguing, as leaving ſomewhat to the exerciſe and invention of the mind; for which reaſon it is very frequent, as well in common converſation, as in the moſt polite writers. It not only ſhortens diſcourſe, and adds a certain ſtrength and livelineſs to our reaſoning, but alſo gives the reader a pleaſure not unlike that the author himſelf feels in compoſing. By this means we are put upon exerting ourſelves, and ſeem to ſhare in the diſcovery of what is propoſed to us.

ENTIER, in the manege, a reſty horſe that not only refuſes to turn, but alſo reſiſts the hand.

ENTIERTY, or ENTIERTIE, among lawyers, implies the whole of a thing, in contradiſtinction to a moiety: thus a bond, damages, &c. are ſaid to be intire, when they cannot be apportioned.

ENTIRE TENANCY, in law, is when the ſole poſſeſſion is in one perſon, in contradiſtinction to ſeveral tenancy, which is a joint, or common poſſeſſion of two or more.

ENTITIVELY, and ENTIETY, among metaphyſicians. See ENS.

ENTOYER, in heraldry, denotes a border charged wholly with things without life: it ſeems to be a corruption of the French *entour*, round about.

ENTREPAS, in the manege, a broken pace or going that is neither walk nor trot, but has ſomewhat of an amble.

ENTROCHUS, in natural hiſtory, the name of a genus of foſſils, of a very regular figure and ſtructure, ſuppoſed, by many authors, to be lapides ſui generis, and ſtones in their native ſtate. They are, however, in reality, the foſſil remains of ſome marine animal, probably either of the echinus, or of the ſtar-fiſh kind, filled, like the foſſil ſpecies of the echini, with a plated ſpar.

ENTRY, in law, ſignifies taking poſſeſſion of lands or tenements, where a perſon has a right ſo to do. It is alſo uſed for a writ of poſſeſſion.

Bill of ENTRY, in commerce. See BILL.

ENVELOPE, in fortification, a work of earth, ſometimes in form of a ſimple parapet, and at others, like a ſmall rampart with a parapet; it is raiſed ſometimes on the ditch, and ſometimes beyond it.

Envelopes are often made to encloſe a weak ground, where that is practicable, with ſingle lines, to ſave the great charge of horn-works and tenails, or where there is not room for ſuch large works. Some give the name of ſillon, counterguard, conſerve, and lunette, to envelopes raiſed in the moat.

ENVIRONNE, in heraldry, ſignifies ſurrounded with other things: thus, they ſay, a lion environné with ſo many bezants. See the article BEZANT.

ENUMERATION, an account of ſeveral things, in which mention is made of every particular article.

ENUMERATION, in rhetoric, a part of peroration, in which the orator, collecting the ſcattered heads of what has been delivered throughout the whole, makes a brief and artful relation, or recapitulation thereof.

ENVOY, a perſon deputed to negociate ſome affair with any foreign prince or ſtate.

ENURNY, in heraldry, is applied to a border charged with beaſts.

ENVY, in ethics, is defined to be an uneaſineſs of the mind, cauſed by the conſideration of a good we deſire, obtained by one we think leſs worthy of it than ourſelves. See the article PASSION.

EPACTS, in chronology, the exceſſes of the ſolar month above the lunar ſynodical month, or of the ſolar year above the lunar year of 12 ſynodical months.

The common lunar year of 12 ſynodical lunations conſiſts of but 354 days, 8 hours, 48 min. 57 ſec. whereas the ſolar or tropical year conſiſts of 365 days, 5 hours, 48 min. 57 ſec. it is plain therefore that the ſolar year exceeds the lunar by 10 days, 21 hours, 00 min. 19 ſec. and in the ſpace of about 33 years, the beginning of the lunar year will have moved through all the variety of ſeaſons, whence it is called the moveable lunar year; and this form of the year is at this time uſed by the Turks and Arabs.

Hence, as the Julian year is 365 days, 6 hours, and the lunar year, as above, only 354 days, 8 hours, 48 min. 57 ſec. the annual epact will be 10 days, 21^h $11'$ $22''$; that is, nearly 11 days. Conſequently, the epact of 2 years is 22 days; of 3 years, 33 days; or rather 3, ſince 30 days is an emboliſmic, or intercalary month.

Thus, the epact of 4 years is 14 days, and ſo of the reſt; and at the end of every 19th year, the epact becomes 30 or 0; conſequently the 20th year the epact is 11 again; and ſo the cycle of epacts expires with the golden number, or lunar cycle of 19 years, and begins again with the ſame.

Again, as the new moons are the ſame, that is, as they fall on the ſame day every 19 years, ſo the difference between the lunar and ſolar years is the ſame every 19 years: and becauſe the ſaid difference is always to be added to the lunar year, in order to adjuſt, or make it equal to the ſolar year, hence the ſaid difference reſpectively belonging to each year of the moon's cycle is called the epact of the ſaid year, that is, the number to be added to the ſaid year, to make it equal to the ſolar, the word being formed from the Greek επαγω, *induco*, *intercalo*.

Upon this mutual reſpect between the cycle of the moon, and the cycle of the epacts, is founded this rule for finding the epact belonging to any year of the moon's cycle. Multiply the year given of the moon's cycle into 11, and if the product be leſs than 30, it is the epact ſought; if the product be greater than 30, divide it by 30, and the remainder of the dividend is the epact according to the Julian account.

But as a ſynodical month or ſpace of time contained between the moon's parting from the ſun, at a conjunction. and returning to him again, is 29 days, 12 hours, 44 min. and 6 ſec. it follows, that 235 lunations are made in 6939 days, 16 hours, 43 min. 30 ſec. but in 19 Julian years are 6939 days, 18 hours; and, conſequently, the new moons, after 19 Julian years, will not return to the ſame hour of the day, but will happen 1 hour, 16 min. 30 ſec. ſooner.

And therefore, becauſe the new moons do not return at the ſame time of the day that they did 19 years before; but in 312 years they will anticipate one day; we muſt, in order to find the epact according to the Gregorian calender, make proper allowance for the anticipation ſince the Nicene council, which was held in 325.

To do this, divide the centuries of the propoſed year by 4; let the quotient be multiplied by 43, and the remainder by 17; to the ſum of theſe products add 86, and divide the whole by 25. Let the quotient (neglecting fractions) be ſubtracted from 11 times the prime or golden number, then will the remainder, rejecting thirties, be the epact required.

To find the epact until the year 1900, the following rule will ſerve:

Subtract 1 from the prime or golden number, multiply the remainder by 11, and, rejecting thirties as before, the remainder will give the epact.

Example. Let it be required to find the epact for the year 1765.

By the firſt rule 4) 17 (1
4 17
43
172
17
86
25) 275 | 11
G N° = 18
11
18
18
198
11
30) 187 | 6
180
..7 = the epact.

By the ſecond rule
G N° = 18
1
17
11
17
17
30) 187 | 6
180
7 — the epact as before.

EPANORTHOSIS, in rhetoric, a figure by which a perſon corrects, or ingeniouſly revokes, what he juſt before alledged, as being too weakly expreſſed, in order to add ſomething ſtronger and more conformable to the paſſion with which he is agitated.

EPARER, in the manege, ſignifies the flinging of a horſe, or his yerking and ſtriking with his hind legs. See YERK.

EPAULE, in fortification, denotes the ſhoulder of a baſtion, or the place where its face and flank meet, and form the angle called the angle of the ſhoulder. See the article BASTION.

EPAULEMENT, in fortification, a work raiſed to cover ſidewiſe, is either of earth, gabions, or faſcines, loaded with earth. The epaulements of the places of arms for the cavalry, at the entrance of the trenches, are generally of faſcines mixed with earth.

EPAULEMENT alſo denotes a maſs of earth, called, likewiſe, a ſquare orillon, from its figure, raiſed to cover the cannon of a cazemate, and faced with a wall.

It is likewiſe uſed for any work, thrown up to defend the flank of a poſt, or other place.

EPEMBOLE, in rhetoric, the ſame with parembole. See the article PAREMBOLE.

EPENTHESIS, in grammar, the interpoſition or inſertion of a letter or ſyllable in the middle of a word, as *alituum*, for *alitum*; *relligio*, for *religio*; *induperator*, for *imperator*, *&c.*

EPHA, or EPHAH, in Jewiſh antiquity, a meaſure for things dry, containing 1.0961 of a buſhel. See MEASURE.

EPHEDRA, ſea-horſe-tail, in botany, a low ſhrubby plant, which ſends forth a few ſhort branches, riſing about two feet high, with many protuberant joints, from whence come out ſeveral narrow ruſhy leaves, which continue green throughout the year. It is of the diœcia claſs, bearing male and female flowers on different plants; the male are amentaceous, deſtitute of a corolla, but the peranthium contains ſeven ſtamina, coaleſing in a ſubulated column; the female flower is alſo apetalous, but conſiſts of a quintuplex calyx, with two ovated germina, which afterwards becomes two baccated ſeeds acutely oval, convex on one ſide and plain on the other.

EPHEMERA, in medicine, the name of a ſpecies of fever, continuing the ſpace of one day, or ſometimes more; for the medical writers expreſs themſelves by *ephemera ſimplex, vel plurium dierum.*

This ſpecies of fever has this peculiar to it, that the pulſe is at firſt large, but as it becomes afterwards moderately quick and frequent, ſo it is equal, ſoft, and regular, as in a natural ſtate. The urine undergoes little or no charge, nor is the diſorder preceded by a loathing of food, a ſpontaneous laſſitude of the body, diſturbed ſleep, preternatural yawning, or horror; but it ſeizes the patient ſuddenly, and afflicts him with no other ſymptoms than a pain of the head and ſtomach, a nauſea, heat, and reſtleſſneſs. The perſons moſt ſubject to this fever, are young men who have much blood, and feed heartily, and ſuch as have had any habitual diſcharge of blood ſtopped upon them, whether natural, as in the hæmorrhoidal or menſtrual diſcharges, or artificial, ſuch as frequent bleeding, cupping, and the like; and thoſe who have thrown their blood into violent emotions by the too free uſe of ſpirituous liquors, too violent exerciſe, unuſual watchings, long ſtay by large fires, a ſudden repreſſion of ſweats by cold water, or by violent paſſions, particularly anger. In the treatment of this fever, the proper courſe is to attemperate the violent motions of the blood with nitrous and the fixed antimonial medicines, and occaſionally with gentle acids. Sweat is to be promoted. Nitre, crabs-eyes, &c. may be preſcribed in ſmall doſes every three or four hours; and towards night, ſodorifics ſhould be joined to theſe, ſuch as the contrayerva-root, or the like. The ephemera, properly ſo called, differs in nothing, except the time of its duration, from that which commonly laſts four days.

EPHEMERA MALIGNA is alſo a term by which ſome authors have called the ſudor anglicanus, or malignant diary fever, which generally deſtroyed the patient in twenty-four hours. See the article SUDOR ANGLICANUS.

EPHEMERA, the day-fly, in zoology, a genus of flies belonging to the neuroptera order, and ſo called from their living only one day and a night: they are about the ſize of the leſſer houſe-flies, and have two gibbous protuberances on the top of the head, reſembling eyes; add to this, that the tail is furniſhed with hairs, and the antennæ are ſhort.

Of this genus there are ſeveral ſpecies, diſtinguiſhed by their different colours, and the number of hairs in their tail; ſome have two, and others three.

EPHEMERIDES, in aſtronomy and chronology, an appellation given to ſuch books that contain the longitudes and latitudes of the planets, their paſſages over the meridian, and their declination; their conjunction among themſelves, and with the fixt ſtars; the occultations of the principal fixt ſtars by the moon; the eclipſes of Jupiter's ſatellites, and, in general, all the calculations which are neceſſary for a knowledge of the actual ſtate of the heavens, and for facilitating aſtronomical obſervations.

In France there are ſeveral ephemerides publiſhed, but thoſe calculated by De la Caille and De la Land are in the greateſt eſteem, and moſtly uſed by aſtronomers in England, being the beſt that have appeared of the kind in any nation. However, in a ſhort time, we may expect to ſee one far ſuperior to theſe, which will be publiſhed in England for the year 1767.

The honourable commiſſioners of the Board of Longitude, from various reports that have been made to them by perſons well ſkilled in navigation and aſtronomy, of the great uſefulneſs of ſuch a book, have taken it into conſideration, and have come to a reſolution to employ five perſons, at the government's expence, to calculate a nautical ephemerides for the uſe of ſailors in general, and by which (with the help of the general table, diſcovered and now making by Mr. Witchell) they may with eaſe determine the longitude of a ſhip at ſea by only obſerving the diſtance of the moon from a fixt ſtar, or from the ſun, with a Hadley's quadrant.

EPHIPPUIM, in anatomy, the ſame with the cella turcica, being a part of the os ſphenoides. See the article Sphenoides.

EPHOD, in Jewiſh antiquity, one part of the prieſtly habit; being a kind of girdle which, brought from behind the neck over the two ſhoulders, and hanging down before, was put croſs the ſtomach, then carried round the waiſt, and made uſe of as a girdle to the tunic.

There were two ſorts of ephods, one of plain linen for the prieſts, and the other embroidered for the high-prieſt: of this laſt Moſes gives an ample deſcription. It was compoſed of gold, blue, purple, crimſon, and twiſted cotton. Upon part of it, which paſſed over the ſhoulders, were two large precious ſtones, one on each ſhoulder: upon theſe were engraven the names of the twelve tribes, ſix upon each ſtone.

The ephod was peculiar to the prieſthood, and thought eſſential to their character; it being the opinion of the Jews, that no worſhip, true or falſe, could ſubſiſt without a prieſthood and ephod.

EPHORI, εφοροι, in Grecian antiquity, magiſtrates eſtabliſhed in ancient Sparta to balance the regal power.

EPIC, or Heroic Poem, a diſcourſe formed upon a ſtory partly real and partly feigned, repreſenting ſome glorious and fortunate action, that is diſtinguiſhed by a variety of wonderful, yet probable and pleaſing events, and delivered in verſe by way of narration, in a ſublime and flowing ſtile; to form the manners, and inflame the mind with the love of virtue.

What diſtinguiſhes an epic from a dramatic poem, is, its being a narration that comes immediately from the poet, and is not repreſented as a tragedy by perſons introduced for that purpoſe.

The chief things to be conſidered in an epic poem are, firſt, the fable, that is, the form, and artful repreſentation of the action, which is the matter of the poem; and as the action is more or leſs perfect, ſo is the fable. The action in an epic poem, as well as in tragedy, muſt be one, not all the actions of a perſon's life; becauſe the mind is better ſatisfied with the contemplation of a ſingle object that is eaſily underſtood, than when it is perplexed with a variety, and loſt in confuſion. And on this principal action muſt all the epiſodes or under-actions ſo depend, as to become different, yet uſeful, members of the ſame body, and contribute to its ſupport. It muſt likewiſe be entire, that is, complete in all its parts, or, as Ariſtotle deſcribes it, have a beginning, a middle, and an end. Nothing ſhould go before, be intermixed with, or follow after this main action, but what is related to it: nor ſhould any ſingle ſtep be omitted in that juſt and regular proceſs, which it muſt be ſuppoſed to take from its origin to its conſummation. The epic action ought alſo to be great, that it may ſtrike us with awe, and be ſuitable to the dignity of the princes, heroes, and illuſtrious perſons, who are ſuppoſed to be ſpeaking and acting in the poem. It ſhould likewiſe be intereſting, that it may engage our paſſions and affections; and entire, that the mind may be wholly ſatisfied. As to its duration, it is not circumſcribed within any limited time; but the warmer and more violent the action is, the ſhorter muſt be its continuance. Thus the Iliad, whoſe ſubject is the anger of Achilles, contains only forty-ſeven days: but the Æneid, whoſe hero is of a quite different character, takes up a much longer time.

The manners and ſentiments fall under the ſame rule as thoſe of tragedy: and as to the diction, it ought to be perſpicuous, but at the ſame time figurative, noble, and ſublime. See Tragedy.

The moderns ſeem to miſtake that part of the epic and tragedy which contain the wonderful, confounding it with improbable, and uſing the two words promiſcuouſly. If it was really ſo, the wonderful would be always faulty; for that is always ſo which is improbable. The great art is a juſt temperament and mixture of both, to make it natural and probable. Scarce any of the poets but Virgil had the art, by the preparation of incidents, to manage the probability in all the circumſtances of an epic poem. Homer is not altogether ſo ſcrupulous and regular in his contrivances: his machines are leſs juſt, and all his meaſures, to ſave the probility, are leſs exact. Laſtly, the ſovereign perfection of an epic poem, in the opinion of Ariſtotle, conſiſts in the juſt proportion and perfect connection of all the parts. It is not ſufficient that all be grand and magnificent in an epic poem, but all muſt be juſt, uniform, and proportionable, in the different parts that compoſe it.

This is all that can be obſerved moſt eſſential to an epic poem: little need be ſaid about the machinery, which, among the ancient heathens, was the agency of their falſe gods, and of angels and dæmons among us chriſtians: its beauty and magnificence is well known. The dignity of an epic poem would ſcarce be kept up without it, eſpecially ſince the marvellous depends on it. The verſification of epic poetry, among the Greeks and Romans, conſiſted of hexameters, a ſort of verſe ſo peculiar to the epic, that when it is uſed upon other occaſions, it is called heroic verſe. Our Engliſh verſe comes neareſt to it both in gravity and majeſty, but at how great a diſtance? See the article Hexameter.

An epic or heroic poem is the beſt and moſt perfect kind of poetry; it is the greateſt work which the ſoul of man is capable of performing; and here it is the utmoſt bounds are ſet to human compoſition. All the nobleneſs and the elevation of the moſt perfect genius can hardly ſuffice to form ſuch a one as is requiſite for an heroic poet: the difficulty of finding together fancy and judgment, heat of imagination and ſobriety of reaſon, precipitation of ſpirit and ſolidity of mind, renders this character ſo very rare: it requires great images, and yet a greater wit to form them. There muſt be a judgment ſo ſolid, a diſcernment ſo exquiſite, ſuch perfect knowledge of the language in which he writes, ſuch obſtinate ſtudy, profound meditations, and vaſt capacity, that ſcarce whole ages can produce one genius fit for an epic poet: even among the ancients themſelves, if we except Homer and Virgil, we ſhall ſcarce find one that is truly an epic poet.

EPICARPIUM, in ancient pharmacy, denotes a remedy applied in form of a plaſter to the wriſts: it conſiſted of penetrating ingredients, as garlic, onion, camphor, &c.

EPICEDIUM, επικηδιον, in ancient poetry, a poem rehearſed during the funeral ſolemnity of perſons of diſtinction. See the article Nenia.

EPICERASTICA, επικηραστικα from κεραννυμι, to mix or attemperate. Medicines which attemperate or obtund the acrimony of the humours, and mitigate the uneaſy ſenſation of the parts thence ariſing.

EPICHIREMA, επιχειρημα, in logic, a mode of reaſoning, which comprehends the proof of one or both the premiſes of a ſyllogiſm, before the concluſion is drawn.

EPICOENE, in grammar, a term applied to nouns, under the ſame gender and termination, mark indifferently the male and female ſpecies.

EPICUREAN PHILOSOPHY, the doctrine or ſyſtem of philoſophy maintained by Epicurus and his followers.

Epicurus, the Athenian, one of the greateſt philoſophers of his age, was obliged to Democritus for almoſt his whole ſyſtem, notwithſtanding he piqued himſelf upon deriving every thing from his own fund. He wrote a great number of books, which are made to amount to above 300. Though none of them are come down to us, no ancient philoſopher's ſyſtem is better known than his, for which we are moſt indebted to the great Lucretius, Diogenes Laertius, and Tully.

His philoſophy conſiſted of three parts, canonical, phyſical, and etherial. The firſt was about the canons, or rules of judging. The cenſure which Tully paſſes upon him for his deſpiſing logic, will hold true only with regard to the logic of the ſtoics, which he could not approve of, as being too full of nicety and quirk. Epicurus was not acquainted with the analytical method of diviſion and argumentation, nor was he ſo curious in modes and formation as the ſtoics. Soundneſs and ſimplicity of ſenſe, aſſiſted with ſome natural reflections, was all his art. His ſearch after truth proceeded only by the ſenſes, to the evidence of which he gave ſo great a certainty, that he conſidered them as an infallible rule of truth, and termed them the firſt natural light of mankind.

In the ſecond part of his philoſophy, he laid down atoms, ſpace, and gravity, as the firſt principles of all things: he did not deny the exiſtence of a God, but thought it beneath his majeſty to concern himſelf with human affairs: he held him a bleſſed, immortal being, having no affairs of his own to take care of, and above meddling with thoſe of others. See Atomical Philosophy.

As to his ethics, he made the ſupreme good of man to conſiſt in pleaſure, and conſequently ſupreme evil in pain. Nature itſelf, ſays he, teaches us this truth, and prompts us from our birth to procure whatever gives us pleaſure, and avoid what gives us pain. To this end he propoſes a remedy againſt the ſharpneſs of pain: this was to divert the mind from it, by turning our whole attention upon the pleaſures we have formerly enjoyed: he held that the wiſe man muſt be happy, as long as he is wiſe; that pain, not depriving him of his wiſdom, cannot deprive him of his happineſs.

There is nothing that has a fairer ſhew of honeſty than the moral doctrine of Epicurus. Gaſſendus pretends, that the pleaſure in which this philoſopher has fixed the ſovereign good, was nothing elſe but the higheſt tranquility of mind in conjunction with the moſt perfect health of body: but Tully, Horace, and Plutarch, as well as almoſt all the fathers of the church, give us a very different repreſentation: indeed the nature of this pleaſure, in which the chief happineſs is ſuppoſed to be ſeated, is a grand problem in the morals of Epicurus. Hence there were two kinds of Epicureans, the rigid and the remiſs: the firſt were thoſe who underſtood Epicurus's notion of pleaſure in the beſt ſenſe, and placed all their happineſs in the pure pleaſures of the mind, reſulting from the practice of virtue. The looſe or remiſs Epicureans, taking the words of that philoſopher in a groſs ſenſe, placed all their happineſs in bodily pleaſures, or debauchery. Thus we have the whole myſtery of this celebrated doctrine. It was innocent in expreſſion, but criminal in thought; it had a beautiful outſide, but it was all corruption within. Theſe looſe philoſophers took up a ſeeming auſterity to diſguiſe their ſecret indulgence, and all their ſchemes of morality were but ſo many veils for their immoral behaviour.

EPICYCLE, is a ſmall circle whoſe center is in the circumference of a greater or a ſmall orb, which being fixed in the large orb of a planet, is carried along with its motion, and yet by its own peculiar motion carries the body of the planet round its proper axis. The epicycle was of great uſe in the Ptolemaic aſtronomy for ſolving the different phaſes and phænomena that happen among the planets, but it is quite omitted in the copernican ſyſtem.

EPICYCLOID, is a curve generated by a point taken in the periphery of a circle that rolls or revolves upon the periphery of another circle either within or without.

Caſe I. If the circle ABC remains immoveable while AMDP (plate LIII. *fig*. 2.) runs on its circumference, then every epicycloid, as A *e* Q *g h*, is called ſimple or ordinary, and its following properties are evident.

1°. Let the velocities of that circle be ever ſo unequal, the arc AB (which call the baſe of the epicycloid) is equal to the circumference AMDP.

2°. If the arc OI, ſimilar to the arc AB, be divided into four equal parts, at the points E, F, G, the center O will have come to the point E, when the point A has deſcribed a fourth part of its track in returning to the circle ABC: the ſame happens at the points F, G, I, where the center of the circle AMDP is found at the end of each fourth part of its return to the circumference ABC. Therefore, if through the pipe F be drawn a radius prolonged, it will give the point Q for the vertex of the epicycloid; and the part QT of this radius will be its axis, which is equal to the diameter of the circle AMDP. And if from the point E as a center, with a radius equal to OA, an arc of a circle be deſcribed towards O, it meets the epicycloid in the point *e*, where the point A was when the center O was in E. In the ſame manner the point A will alſo be found to have been in *g*, when the center was in G; whence it follows, that the arc A *e* was deſcribed while the point A retrograded in deſcribing a part of its inferior ſemi-circle; and the arc *e* Q *g* was deſcribed while the point A deſcribed its upper ſemi-circle with a direct motion: laſtly, the arc *g* B was deſcribed while the point A retrograded in the other part of its inferior ſemi-circle.

3°. The epicycloid is biſected in the vertex Q; and the legs Q *e* A, Q *g* B, of the curve are equal, and ſimilarly poſited with reſpect to the axis TQ.

4°. The arcs A *e*, *g* B, bend towards the axis TQ; becauſe the retrograde motion of the point A carries them in that direction: but they do not return into themſelves, as in *fig*. 3, becauſe the path OI of the center A being in every revolution greater than the arc AB, which is equal to the circumference AMDP, the motion of that center in the direction OIN draws the point A towards K, more than its retrograde motion about the center O carries it an oppoſite direction.

5°. The deſcribing point A, in paſſing from the leg Q *g* B into the leg BK of the next epicycloid, makes an angle at B: for the point deſcribing the laſt leg of the epicycloid AQB, the inſtant it comes to B, immediately riſes again into the firſt leg of the other epicycloid BKC, and deſcribes no ſpace between theſe legs.

6°. The point A viewed from S, appears always direct, but the velocity ſeems to accelerate all along the leg A *e* Q to be greateſt at the vertex Q, and then to diminiſh along the leg Q *g* B, ſo as to become nothing in the point B; then again it accelerates in the leg BK.

Caſe II. If, while the circle AMDP rolls on ABC, the latter ſhould alſo turn on its center S, in the ſame direction ABC: (*fig*. 4.) or in general, if the center of the circle AMPD advances in the circle OFI, with a greater velocity than the point A has in revolving in the circle AMPD; then the epicycloid deſcribed during the revolution of the point A, would be lengthened; and evidently have the following properties:

1°. Since all the points of a ſimple epicycloid would advance towards C, although the circle ABC was at reſt; then, if ABC advances alſo in the ſame direction, the velocity of the deſcribing point muſt be greater in that direction, and conſequently make thoſe ſpaces longer; ſo that the baſe AB of the epicycloid muſt be equal to the ſum of the circumference AMDP, and that arc the circle ABC has deſcribed during a return.

2°. If the motions of the two circles are uniform, the points E, F, G, dividing OI into four equal parts, will determine, as above, the epicycloidal arcs A *e*, *e* Q, Q *g*, *g* B, anſwering to the motion of the point A in the inferior and ſuperior parts of its circle; the axis TQ will be equal to the diameter AD, and the legs Q *e* A, Q *g* B, are equal, and ſimilarly poſited in reſpect to the axis.

3°. The greater the velocity of the circle ABC, the leſs the arcs A *e*, *g* B, bend towards TQ.

4°. The deſcribing point does not form an angle in paſſing from the leg Q *g* B into the leg BK, but makes a curve in B, which is more obtuſe as the velocity of the circle ABC is greater: for this velocity makes the point A deſcend more obliquely along the leg Q *g* B; and when arrived at B, makes it deſcribe a ſmall ſpace on ACB, before it aſcends into the leg BK, ſo that the paſſage is through a curve *g* BK.

5°. The point A viewed from the point S, is always direct; and its velocity accelerates from A to Q; then diminiſhes from Q to B; where it appears to be nothing, or only equal to the velocity of the circle ABC.

Caſe III. If, during the time of the return of A to the circle ABC, this circle ſhould alſo turn on its center in an oppoſite direction; or in general, if the center of the circle AMPD advances in the circle OFI, with leſs velocity than that wherewith the point A moves in the circle AMDP; then the epicycloid would become ſhortened. This caſe might be ſubdivided into ſeveral others, but not to make this theory needleſsly complex, let only the retrograde velocity of the circle ABC be ſuppoſed leſs than that of the point A in its circle AMDP. Now on this hypotheſis,

1°. If the circle ABC (*fig.* 3.) had remained immoveable, none of the points of the epicycloid would have retrograded; but as ABC retrogrades, its motion muſt augment the velocity of the point A in the inferior ſemi-circle where it retrogrades, and diminiſh it in the upper ſemi-circle where it is direct. Hence it follows, that the extent of the epicycloid will be diminiſhed in the direction ABC, its baſis becoming equal to the difference between the circumference of the circle AMDP, and the arc which the circle ABC has deſcribed during the return of the point A.

2°. Theſe two motions being uniform, the arcs Ae, eQ, Qg, gB, will, as above, be found anſwering to the upper and inferior parts of the circle AMDP; the axis $TQ=AD$, and the legs QeA, QgB, equal and in ſimilar poſitions in reſpect of the axis TQ.

3°. The arcs Ae, gB, anſwering to the retrograde motion of the point A, are more curved towards the axis TQ, in proportion as the velocity of the circle ABC is greater; and at the point B the arc muſt turn inwards; becauſe then the point A moves contrary to the tendency towards C, by the ſum of both motions.

4°. The paſſage of the point A through the point B is made by a curve gBm, returning towards itſelf: for when the point A has deſcribed the leg QgB, and arrives at B, the retrograde velocity of the circle ABC cauſes it to deſcribe a ſmall ſpace before the point A aſcends by the leg BmK.

5°. The point A viewed from the point S, appears ſometimes direct, ſometimes retrograde, and ſometimes immoveable, or ſtationary. For the tangents Sm, Sn, St, Sy, being drawn from the point S, ſhew that the point A appears direct in deſcribing the arc $nQgt$, all the points of that arc being directed towards C: when the point A is in the tangent St, it muſt appear ſtationary, that is, tending neither towards C nor O, during the time of deſcribing the arc of the curve which coincides with the tangent: afterwards the point A ſeems retrograding in the arc tBm, that is, in the arc comprehended between the two tangents; and in the point m it again ſeems ſtationary: laſtly, it appears direct in the arc mKy, till it becomes ſtationary in y; then retrogrades as before, and ſo on. Therefore the point A during every revolution in its circle, appears twice ſtationary, once direct, and twice retrograde.

6°. The velocity of the point A muſt appear equal to nothing in the ſtationary points; then it appears accelerated until A comes to the vertex of the curve, where the velocity ſeems greateſt; becauſe the arcs then deſcribed are directly expoſed to the eye; then it diminiſhes from theſe points to the next ſtationary point.

7°. The greater the velocity of the circle ABC, the greater is the arc of retrogradation tBm.

Corol. Therefore in theſe ſorts of motions, the nature of the epicycloid generally depends on the relation of its baſe AB to the circumference of the circle where the deſcribing point is.

Schol. If, in the ſecond and third caſes, the motion of theſe circles had not been uniform, the epicycloid would then have been leſs regular, and the axis TQ not in the middle between the legs QeA, QgB; nor the legs equal or in like poſitions; one would be longer than the other, according as the combination of the velocities urged more on one ſide than on the other: but the epicycloid would retain nearly the ſame figure; that is, it would always have a curvature towards B, diſpoſed in the ſame manner as in *fig.* 3 and 4.

From this general theory ſuch concluſions may be drawn as are applicable to the phænomena of the motions of the planets, according to the order in which they are ranged in the ſolar ſyſtem.

EPIDEMIA, *επιδημια*, in Grecian antiquity, feſtivals kept in honour of Apollo and Diana, at the ſtated ſeaſons when theſe deities, who could not be preſent every where, were ſuppoſed to viſit different places, in order to receive the vows of their adorers.

The feſtival took its name epidemia, from *επι*, among, and *δημος*, people; on account of the imaginary preſence of thoſe deities among the people.

EPIDEMIA is alſo uſed for the private feaſts, or rejoicings, on account of the ſafe return of a friend from a voyage or journey.

EPIDEMIC, among phyſicians, an epithet of diſeaſes, which, at certain times, are popular; attacking great numbers at or near the ſame time.

EPIDEMIC diſeaſes differ from thoſe called endemic. See the article ENDEMIC.

We muſt remark, ſays the celebrated Boerhaave, that though every particular diſeaſe of the fluids, in various epidemical conſtitutions, appear, to inattentive obſervers, the ſame with regard to their names, ſigns, and their conſequences in ſome meaſure, yet the ſame diſeaſes, appearing in one epidemical conſtitution, differ exceedingly from thoſe produced in another, with reſpect to their obſcure natures; their appearances not obſervable, except by the judicious; the various times of their increaſe, ſtate, coction, criſis, effect, event, and method to be purſued for the cure. Hence it is evident, that they require a different adminiſtration of the non-naturals, different treatment and medicines: this variety, however, in epidemical diſtempers, is ſo obſcure, that phyſicians have not yet been able to deduce it from any abuſe of the non-naturals: and yet there are many circumſtances which make it highly probable, that the cauſes reſide in the air, but depend more upon the inexplicable variety of exhalations contained therein, which, by their mixture with the fluids of the body, or their ſtimulus, injure the human machine, than upon any change in the ſenſible qualities thereof. But it is very ſurpriſing, that theſe epidemical diſorders ſhould be principally propagated by contagion, received from one by another perſon unaffected.

Upon the invaſion of any unknown epidemical diſtemper, the phyſician will receive ſome information with reſpect to the cure, firſt, by reducing the diſtemper to ſome more known ſpecies, which it moſt reſembles.

Secondly, by obſerving its tendency at the vernal and autumnal equinoxes, at which ſeaſon it is generally moſt prevalent.

Thirdly, by attending to the ſpontaneous phænomena which precede, accompany, or follow, the death or recovery of the patient, and the better or worſe ſtate of the diſorder.

Fourthly, by diligently remarking the benefit or injury received, from whatever the patients are unavoidably obliged to do; whatever is taken into, or diſcharged out of the body.

Fifthly, by comparing the caſes of a great many patients labouring under the diſtemper at the ſame time.

Sixthly, by abſtaining from all remedies which are dubious, which exagitate and induce a conſiderable change in the humours, and thereby obſcure the genus of the diſeaſe.

From theſe circumſtances, duly attended to, the curative indication ariſes.

EPIDERMIS, in anatomy, the ſame with the cuticle. See the article CUTICLE.

EPIDIDYMUS, in anatomy, the name by which ſome call the two bodies more uſually known by that of paraſtatæ. See the article PARASTATÆ.

EPIGASTRIC REGION, a part or ſubdiviſion of the abdomen. See ABDOMEN.

EPIGASTRIC VESSELS, the arteries and veins belonging to the epigaſtric region; the former being branches of the cœliac artery, and the latter of the iliac veins. See ARTERY and VEIN.

EPIGLOTTIS, in anatomy, one of the cartilages of the larynx, or wind-pipe. It is often of the ſhape of an ivy-leaf, and joined to the thyroide cartilage; over which it appears erect, immediately behind the root of the tongue; to which it is alſo connected by its middle ligament by two lateral ones to the cornua of the os hyoides, and by two poſterior ones to the arytenoide cartilage. In the act of ſwallowing it covers the glottis, or aperture of the larynx, and prevents any thing getting into it. See the articles LARYNX and GLOTTIS.

EPIGRAM, in poetry, a ſhort poem, or compoſition in verſe, treating of one thing only, and whoſe diſtinguiſhing characters are brevity, beauty, and point.

The word epigram ſignifies inſcription; for epigrams derive their origin from thoſe inſcriptions placed by the ancients on their ſtatues, temples, pillars, triumphal arches, and the like; which, at firſt, were very ſhort, being ſometimes no more than a ſingle word, but afterwards, increaſing their length, they made them in verſe, to be the better retained by the memory. This ſhort way of writing came at laſt to be uſed upon any occaſion or ſubject; and hence the name of epigram has been given to any little copy of verſes, without regard to the original application of ſuch poems.

Its uſual limits are from two to twenty verſes, though ſometimes it extends to fifty; but the ſhorter the better it is, and the more perfect, as it partakes more of the nature and character of this kind of poem: beſides, the epigram, being only a ſingle thought, ought to be expreſſed in a little compaſs, or elſe it loſes its force and ſtrength.

The beauty required in an epigram, is an harmony and apt agreement of all its parts, a ſweet ſimplicity, and polite language.

The point is a ſharp, lively, unexpected turn of wit, with which an epigram ought to be concluded. There are ſome critics, indeed, who will not admit the point in an epigram, but require the thought to be equally diffuſed through the whole poem, which is uſually the practice of Catullus, as the former is that of Martial. It is allowed, there is more delicacy in the manner of Catullus, but the point is more agreeable to the general taſte, and ſeems to be the chief characteriſtic of the epigram.

This ſort of poem admits of all manner of ſubjects, provided that brevity, beauty, and point, are preſerved; but it is generally employed either in praiſe or ſatire.

Though the beſt epigrams are ſaid to be ſuch as are compriſed in two or four verſes, we are not to underſtand it as if none can be perfect which exceed thoſe limits. Neither the antients or moderns have been ſo ſcrupulous with reſpect to the length of their epigrams; but, however, brevity in general is always to be ſtudied in theſe compoſitions.

EPILEPSY, επιληψια, in medicine, the ſame with what is called the falling-ſickneſs, from the patient's falling ſuddenly to the ground.

Sometimes this diſeaſe comes upon the patient unawares; but it more frequently gives notice of its approach, by a laſſitude of the whole body, a heavy pain in the head, with ſome diſturbance of the ſenſes, unquiet ſleep, unuſual dread, dimneſs of ſight, and a noiſe in the ears: in ſome there is a violent palpitation of the heart, a puffing or inflation of the breaſt, difficult reſpiration, a murmuring noiſe in the belly, fœtid ſtools, a flux of the urine, and refrigeration of the joints: in others, there is a ſenſation as it were of cold air, aſcending from the extreme parts towards the brain and heart. At length, falling ſenſeleſs to the ground, the thumbs are ſhut up cloſe in the palms of the hands, and are with difficulty taken out; the eyes are diſtorted or inverted, ſo as nothing but the whites appear: all ſenſation is ſuſpended, inſomuch that no ſmell, no noiſe, nor even pinching of the body, is able to bring them to themſelves: they froth at the mouth with a hiſſing kind of noiſe; the tongue is lacerated, or torn by the teeth, and there is a ſhaking or trembling of the joints. However, in different patients the ſymptoms vary; for ſometimes, inſtead of convulſive motions, the limbs are all ſtiff, and the patient is as immoveable as a ſtatue: in infants the penis is erected; and in young men, there is an emiſſion of the ſemen, and the urine ſometimes ſtreams out to a great diſtance. At laſt there is a remiſſion of the ſymptoms, and the patients come to themſelves after a longer or ſhorter interval; then they complain of a pain and heavineſs of the head, and a laſſitude of all their joints.

Theſe fits uſually return on certain days, or age of the moon, but eſpecially about the new or full moon; in women, chiefly about the time of menſtruation; and as to the prognoſtics, they generally leave the patient about the time of puberty.

As to the cure, in adults, or grown perſons, it is extremely difficult; but in children, it is juſt the reverſe. Bliſters laid on the back part of the head are of great uſe a little before the fit is expected; which may the more certainly be foreknown, as this diſeaſe is influenced by the moon. The moſt proper medicines to correct the juices ſeem to be native cinnabar, and wild valerian root; a dram of which may be taken morning and evening for three or four months, and afterwards two or three days before the new and full moon. Or, two ſcruples of the powder of wild valerian root, mixed with one of that of native cinnabar, may be taken morning and evening. Ambergriſe and muſk are alſo accounted excellent.

It muſt not however be forgot, that this diſeaſe owes its origin to ſo many different cauſes, and is bred in ſo many different conſtitutions of the body, that the ſame remedy which ſucceeds in one caſe, often fails in another; and, therefore, different medicines are to be tried, eſpecially in adults. In caſe of a plethora, bleeding in the ancles will be proper. If the humours be in fault, cathartics, iſſues, cauteries, and bliſters muſt be uſed. If in children it proceeds from gripes, or the breeding of teeth, nothing is better than to cleanſe the belly by milk clyſters, with a little venice-ſoap diſſolved in them. Some epileptic powder with cinnabar, or extract of rhubarb, and made into an electuary with ſyrup of roſes and manna, may likewiſe be given in proper doſes.

During the fit, too free an uſe of volatiles, ſpirituous liquors, and ſtrong ſmells, are hurtful, as cauſing the humours to flow too much to the head. The beſt method is to place the patient in an erect poſture, and to rub the hands and feet pretty briſkly; and the beſt drink is pure water, which will mitigate, if not cure, the ſymptoms.

When the diſeaſe is cauſed by external violence, or extravaſations of humours in the head, cinnabar reduced into an impalpable powder, and given in large doſes with other cephalics and diaphoretics, has a kind of ſpecific virtue.

According to Dr. Cheyne, a milk-diet will cure the moſt inveterate epilepſy. Miſletoe is alſo ſaid to cure it, as ſure as the bark does an intermitting fever: its doſe, to grown people, is half a dram or more, in powder, to be taken every ſixth hour, drinking after it a draught of a ſtrong infuſion of the ſame plant; and if to every ounce of the powder, a dram of aſa-fœtida be added, the medicine will be ſtill more effectual. Cinnabar of antimony is alſo greatly celebrated for the cure of this diſeaſe, and may be taken from four grains to a ſcruple, in conſerve of roſemary-flowers. If the diſeaſe is inveterate, ſome adviſe to give the following pills for a month, viz. Take caſtor and gum ammoniac, of each eight grains; wild valerian-root, half a ſcruple; ſalt of tartar, ſeven grains; and as much of the tincture of caſtor as is ſufficient to form them into pills, one of which makes a doſe. On every ſeventh day, a cathartic ſhould be given; and ſometimes, inſtead of the caſtor and gum, filings of ſteel may be ſubſtituted.

A decoction of guaiacum, or ſaſſafras, taken twice a day, ſix or eight ounces at a time, and continued for thirty or forty days, is alſo ſaid to cure the epilepſy; eſpecially if male piony-root, or the like, be added.

EPILOBIUM, French willow, in botany, a genus of plants whoſe flower conſiſts of four roundiſh patent petals ſomewhat emarginated, with eight filaments which are ſubulated and alternately ſhorter, theſe are topped with oval compreſſed obtuſe antheræ; the fruit is a very long, cylindraceous, ſtriated capſule, with four cells, and contains a number of oblong ſeeds crowned with down.

This genus includes the chamænerion of Tournefort.

EPILOGUE, in oratory, the end or concluſion of a diſcourſe, ordinarily containing a recapitulation of the principal matters delivered. See PERORATION.

EPILOGUE, in dramatic poetry, a ſpeech addreſſed to the audience after the play is over, by one of the principal actors therein, uſually containing ſome reflections on certain incidents in the play, eſpecially thoſe in the part of the perſon that ſpeaks it.

EPIMEDIUM, barren-wort, in botany, a plant with a creeping root, from which ariſe many ſtalks about nine inches high, each of which is divided into three branches, which are again ſubdivided into three leſſer, upon each of theſe are a ſtiff cordated leaf ending in a point, of a pale green on the upper ſide but grey underneath; below the firſt diviſion of the ſtalk come out the flowers, which are cruciform of a rediſh colour with yellow ſtripes on the border, the ſtamina are four ſubulated filaments topped with oblong erect bivalvular antheræ. The fruit is an oblong acuminated pod of one cell, containing many oblong ſeeds.

EPINICION, in the Greek and Latin poetry, denotes a poem or compoſition on occaſion of a victory obtained. It alſo ſignifies a rejoicing, or feſtival, on account of a victory.

EPIPHANY, a Chriſtian feſtival, otherwiſe called the Manifeſtation of Chriſt to the Gentiles, obſerved on the ſixth of January, in honour of the appearance of our Saviour to the three magi, or wiſe men, who came to adore him and bring him preſents. The feaſt of Epiphany was not originally a diſtinct feſtival, but made a part of that of the nativity of Chriſt, which being celebrated twelve days, the firſt and laſt of which were high or chief days of ſolemnity, either of theſe might be called Epiphany, as that word ſignifies the appearance of Chriſt in the world.

EPIPHONEMA, in rhetoric, a ſententious exclamation, containing a lively remark placed at the end of a diſcourſe; ſuch is that of Virgil:

Fas omne abrumpit, Polydorum obtruncat, & auro
Vi potitur. Quid non mortalia pectora cogis
Auri ſacra fames?

And that of Lucretius, lib. i.

Tantum relligio potuit ſuadere malorum!

This figure cloſes a narration in a very advantageous manner, deeply impreſſes the thing related upon the memory of the reader, and leaves him well pleaſed with the ſenſe and ſagacity of his author.

EPIPHORA, in medicine, a preternatural defluxion of the eyes, when they continually diſcharge a ſharp ſerous humour, which excoriates the cheeks. The cure is performed by a derivation of the offending humour elſewhere, by bleeding, cupping, bliſters, purges, &c. The acrimony is likewiſe to be corrected by bitter chalybeate wine: ſometimes wine drank alone will perform the cure; after which, aſtringent topics are to be made uſe of. See the article RHEUM.

If an epiphora has been of long ſtanding, it is difficult to be cured, and often degenerates into a fiſtula lachrymalis. See the article FISTILA LACHRYMALIS.

EPIPHYLLOSPERMOUS, from φυλλον, a leaf, and ςπερμα, ſeed, among botaniſts, are thoſe plants which bear their ſeeds on the back of their leaves, ſuch as maidenhair, fern, &c. and are the ſame as capillary plants.

EPIPHYSIS, in anatomy, a bony ſubſtance, or as it were a leſſer bone affixed to a larger or principal bone, by the intervention of a cartilage. In young people theſe epiphyſes are not continuous to the principal bone, but are only connected by the intermediate cartilage, and hence they are called appendages to the bones. It is to be obſerved of epiphyſes, 1. That they are all cartilaginous in infants; and though they afterwards grow hard, yet they never arrive at the true denſity of a bone. 2. That moſt of them degenerate into apophyſes in adults. 3. That they do not grow along the plain ſurface of the bone, but unequally, or by a mutual ingreſs with the body of it.

The uſe of the epiphyſes is very different in adults and in infants: 1. In adults they ſeem to ſerve the bones which contain large quantities of marrow, by way of operculum, that this ſoft matter may not run out. 2. They are of ſervice to the articulators, rendering the motions more eaſy, as well as more determinate. 3. They make the whole bone lighter than it would be, if their place were ſupplied by abſolute bony matter. 4. They increaſe the power of the muſcles about the tendons, by means of their prominences. 5. They add to the ſize of the places deſtined for receiving the inſertions of the muſcles. 6. They give a firmer coheſion to the ligaments which ſerve in the articulations, and allow an entrance to the blood-veſſels. The uſes of the epiphyſes in infants are, 1. That by means of their yielding ſoftneſs, they may give way to the compreſſion in the uterus, and ſuffer the whole bulk to be more folded together than otherwiſe it could, ſo that it may lie in a ſmaller compaſs. 2. That they may give way to the elongation and growth of the bones. 3. That they may prevent the frequent fractures, which would otherwiſe unqueſtionably happen to children from their falls, and the other accidents they are liable to.

EPIPLOCELE, in medicine, is a kind of hernia, or rupture, in which the omentum ſubſides into the ſcrotum. The cure conſiſts principally in a reduction of the tumour, by returning the omentum again into the abdomen, and in ſecuring the parts from a relapſe by a truſs or bandage. See HERNIA and ENTEROCELE.

EPIPLOIS, in anatomy, a term applied to the arteries and veins diſtributed through the ſubſtance of the epiploon or caul: thus, the dextera epiplois is a branch of the right ſide of the cæliac artery, and the ſiniſtra epiplois and gaſtro-epiplois are terms by which anatomiſts call branches from the left ſide of the cæliac artery. See the articles CÆLIAC and ARTERY.

EPIPLOOMPHALON, επιπλοομφαλον, in medicine, an hernia umbilicalis, proceeding from the omentum falling into the region of the umbilicus or naval. See the article EXOMPHALUS.

EPIPLOON, the ſame with what is otherwiſe called omentum. See OMENTUM.

EPIPLOSARCOMPHALUS, in ſurgery, a kind of exomphalus. See the article EXOMPHALUS.

EPISCOPACY, the quality of epiſcopal government, or that form of church diſcipline, wherein dioceſan biſhops are eſtabliſhed diſtinct form, and ſuperior to, prieſts or preſbyters. See BISHOP.

EPISCOPAL, ſomething belonging to biſhops. See the articles BISHOP and EPISCOPACY.

EPISCOPALIANS, in church hiſtory, an appellation given to thoſe who prefer the epiſcopal government and diſcipline to all others.

EPISODE, επεισοδιον, in poetry, a ſeparate incident, ſtory, or action, which a poet invents, and connects with his principal action, that his work may abound with a greater diverſity of events: though, in a more limited ſenſe, all the particular incidents whereof the action or narration is compounded, are called epiſodes. See the articles EPIC and TRAGEDY.

The epiſode, in its original, was only ſomething rehearſed between the parts of the chorus, or ancient tragedy, for the diverſion of the audience. Epiſodes ſerve to promote the action, to illuſtrate, embelliſh, and adorn it, and carry it to its proper period. Epiſodes are either abſolutely neceſſary, or very requiſite. All epiſodes are incidents, though all incidents are not epiſodes; becauſe ſome incidents are not adventitious to the action, but make up the very form and ſeries of it. Examples will clear up this diſtinction: the ſtorm in the firſt Æneid of Virgil, driving the fleet on the coaſt of Carthage, is an incident, not an epiſode, becauſe the hero himſelf and the whole body of his forces are concerned in it; and ſo it is a direct and not a collateral part of the main action. The adventures of Niſus and Euryalus, in the ninth Æneid, are epiſodes, not incidents, i. e. not direct parts of the main action.

It is particularly by the art of epiſodes that the great variety of matter which adorns a poem is brought into the principal action: but though the epiſodes are a kind of digreſſion from the ſubject, yet they ought to have a natural relation to the principal acton, never be far fetched, and muſt be handled with judgment, to avoid confuſion and burdening the ſubject with too much action. Without this reſtriction the epiſode is no longer probable, and there appears an air of affectation which becomes ridiculous. Ariſtotle calls all thoſe fables epiſodic, which abound in epiſodes not neceſſarily nor properly connected with each other.

The moſt natural epiſodes are the propereſt to circumſtantiate the principal actions, namely, the cauſes, the effects, the beginnings, and the conſequences of it. Homer and Virgil have ſhewn their principal art in this particular: the action of the Iliad and that of the Æneid were in themſelves exceeding ſhort, but are ſo beautifully lengthened and diverſified by the intervention of epiſodes, that they make up an agreeable ſtory, ſufficient to employ the memory without overcharging it. See the article EPIC.

Our noble poet Milton has excelled in this art; he has no other epiſodes than what naturally ariſe from the ſubject, and yet his poem of Paradiſe Loſt is filled with a multitude of aſtoniſhing incidents. Thoſe great actions, the battle of the angels, and the creation of the world, are by way of epiſode to this noble poem. With the like art, and in the ſame manner, in that part of it which regards the fall of man, he has related the fall of thoſe angels who are his profeſſed enemies; beſides the many other beauties of ſuch an epiſode, its running parallel with the great action of the poem, hinders it from breaking unity ſo much as another epiſode would have done, that had not ſo great an affinity with the principal ſubject.

EPISPASTIC, in medicine, a topical remedy, which being applied to the external parts of the body, attracts the humours to that part.

EPISTLE, επιςολη, denotes the ſame with a miſſive letter; but is now chiefly uſed in ſpeaking of ancient writings, as the epiſtles of St. Paul, epiſtles of Cicero, epiſtles of Pliny, &c. See the article LETTER.

EPISTOLARY, ſomething belonging to an epiſtle.

EPISTROPHE, in rhetoric, a figure wherein that which is ſuppoſed of one thing is ſtrongly affirmed of another: thus, "Are they Hebrews? ſo "am I. Are they Iſraelites? ſo am I. Are they "of the ſeed of Abraham? ſo am I," &c.

EPISTYLE, in the ancient architecture, a term uſed by the Greeks for what we call architrave, viz. a maſſive piece of ſtone or wood, laid immediately over the capital of a column. See ARCHITRAVE and COLUMN.

EPITAPH, a monumental inſcription, which generally contains ſome elogium of the virtues and good qualities of the deceaſed, and has a turn of ſerioufneſs and gravity adapted to the nature of the ſubject. The elegance of epitaphs conſiſts in a nervous and expreſſive brevity; and ſometimes are cloſed with an epigrammatic point. In theſe compoſitions no mere epithet, properly ſo called, ſhould be admitted; for here illuſtration would impair the ſtrength, and render the ſentiment too diffuſe and languid. Words that are ſynonimous are alſo to be rejected.

Though the true charactereſtic of the epitaph is ſeriouſneſs and gravity, yet we find many that are jocoſe and ludicrous; ſome likewiſe have true metre and rhyme, while others are between proſe and verſe, without any certain meaſure, though the words are truly poetical, and the beauty of this laſt ſort is generally heightened by an apt and judicious antitheſis.

EPITASIS, in ancient poetry, the ſecond part or diviſion of a dramatic poem, wherein the plot, entered upon in the firſt part, or protaſis, was carried on, heightened and worked up till it arrived at its ſtate or height, called cataſtaſis.

In the epitaſis, accidents, as they are called by the moderns, ariſe; all things are in confuſion, and involved in doubts and difficulties. Voſſius ſays, the epitaſis is contained in the ſecond, ſometimes in the third and fourth, but very rarely any part of it in the fifth act: but Dr. Trapp ſays, that there is no act to which the epitaſis is not ſuitable; nay, that ſome of it ought always to be in the fifth act.

It is the epitaſis that ſupports the weight and burden of the poem; upon it the criſis of the action chiefly turns. This diviſion of tragedy is laid aſide in the modern drama, inſtead of which plays are divided into acts.

Epitasis, in medicine, the increaſe of a diſeaſe, or beginning of a paroxyſm, particularly in a fever. See Fever.

EPITHALAMIUM, in poetry, a nuptial ſong, or compoſition, in praiſe of the bride and bridegroom, praying for their proſperity, for a happy offſpring, &c.

EPITHEM, in pharmacy, a kind of fomentation, or remedy of a ſpirituous aromatic kind, applied externally to the regions of the heart, liver, &c. to ſtrengthen and comfort the ſame, or to correct ſome intemperature thereof.

EPITHET, in poetry and rhetoric, an adjective expreſſing ſome quality of a ſubſtantive to which it is joined; or ſuch an adjective as is annexed to ſubſtantives by way of ornament and illuſtration, not to make up an eſſential part of the deſcription. Nothing, ſays Ariſtotle, tires the reader more than too great a redundancy of epithets, or epithets placed improperly; and yet nothing is ſo eſſential in poetry as a proper uſe of them. The writings of the beſt poets are full of them, eſpecially Virgil.

EPITOME, in literary hiſtory, an abridgement, or ſummary of any book, particularly of a hiſtory. See Abridgement.

EPITRITUS, in proſody, a foot conſiſting of three long ſyllables and one ſhort. Of theſe, grammarians reckon four kinds; the firſt conſiſting of an iambus and ſpondee, as *sălūtāntēs*: the ſecond, of a trocheus and ſpondee, as *cōncĭtātī*: the third, of a ſpondee and an iambus, as *cōmmūnĭcāns*: and the fourth, of a ſpondee and trocheus, as *incāntārĕ*. See the articles Spondeus, Trocheus, &c.

EPITROPE, in rhetoric, a Greek term for the ſame figure which the Latins call *conceſſio*. See the article Concession.

EPIZEUXIS, in rhetoric, a figure which repeats the ſame word, without any other intervening: ſuch is that of Virgil, *nunc*, *nunc*, *inſurgite remis.*

EPOCHA, or Epoche, in chronology, ſignifies ſome remarkable occurrence from whence ſome nations date and meaſure their computation of time.

As in the heavens there are certain points from which the aſtronomers begin their computations of the planets motions, ſo alſo there muſt be certain points, or inſtants of time, from which, as from roots, all calculations muſt begin: and all memorable actions are diſpoſed and recorded according to the ſeries of years which follow from that root. Theſe roots are called Epochs, or Æras, from which we generally count our years and times. The moſt famous, beſt known, and moſt uſed by us, is that which is reckoned from the nativity of our Lord Jeſus, which begins at the kalends of January that immediately followed his birth.

The epocha of the creation, which is much noted, yet about it there are great controverſies among chronologiſts; ſome affirming that the world was created 3950 years before the birth of Chriſt; others again ſay, that at the birth of Chriſt the age of the world was 3983 years. The Greek church, and the emperors of the Eaſt, uſed an epocha of the creation which was much more ancient, and makes the world to have been created 5509 years before the coming of Chriſt.

Among the prophane authors, the moſt ancient epocha is that of the Olympiads, which begun at the ſummer of the year 777 preceding the birth of Chriſt, and on the kalends of July.

The epoch of Rome, or of the building of the city, is not long after the Olympiads, and there are two of them, the Varronian, and Capitolian; according to the firſt, the city was built the year before Chriſt 753; according to the other, it was in the year 752.

The æra of Nabonaſſar has always been famous among the aſtronomers, and began on the ſixth of February of the Julian year carried backward, and before Chriſt 747. And becauſe that day was then the firſt of the Egyptian year, Ptolomy, and after him Copernicus, computed the motion of the ſtars according to that æra by Egyptian years; for the Egyptian year is very convenient for aſtronomical calculations, it being interrupted by no intercalary days.

After this we have another epocha of the death of Alexander the Great, the 324th year before Chriſt, on the twelfth of November; which was then the firſt day of the Egyptian year. Theon, Albategnius, and ſome others, have computed from thence according to the Egyptian year. Between the two æras of Nabonaſſar and of the death of Alexander, there

PLATE LIII. Facing Equation.

Fig. 1. Self moving Engine.

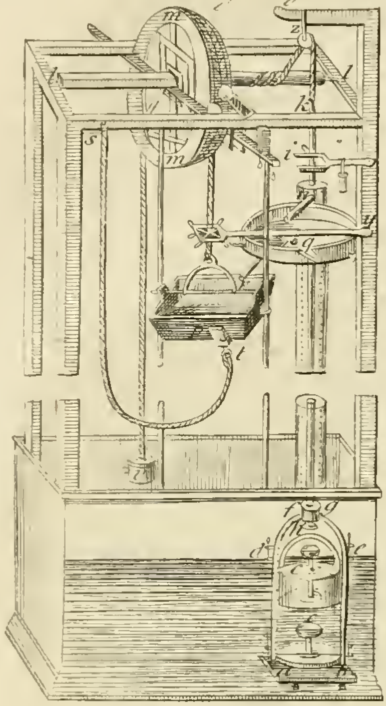


Fig. 2. Epicycloid.

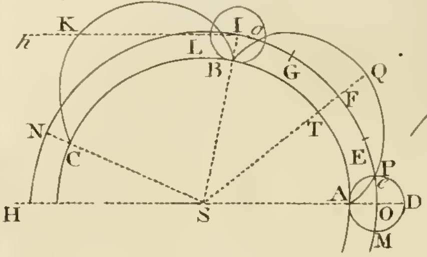


Fig. 3. Epicycloid.

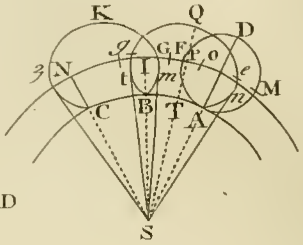


Fig. 4. Epicycloid.

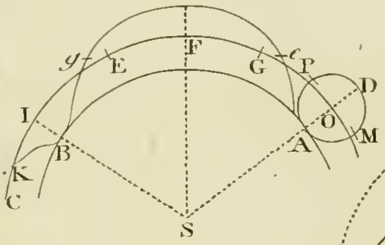


Fig. 5. Equation.

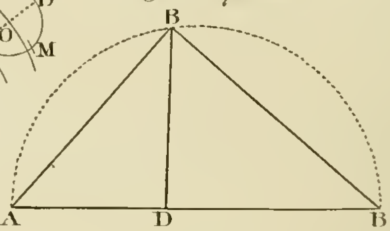


Fig. 9.

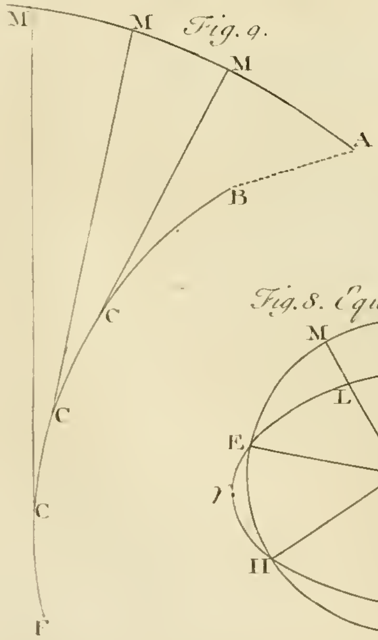


Fig. 6. Equation of Time.

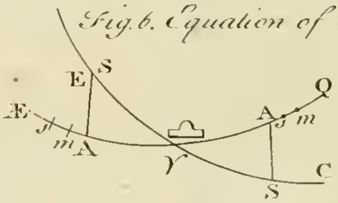


Fig. 7. Equation of Time.

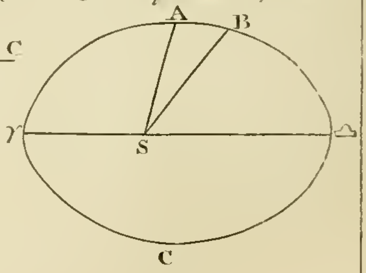


Fig. 8. Equation of Time.

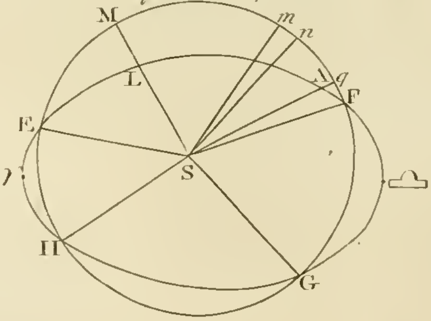
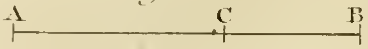


Fig. 10.



J. Lodge sculp.

there are preciſely 424 Egyptian years. The Abiſſines reckon by another æra, which is called the Æra of the Martyrs, or of Diocleſian. The Turks and Arabians reckon by an æra, which they call the Hegira, which takes its beginning from the flight of Mahomet. The Perſians have likewiſe an epoch which they call Ieſdegird; all which are explained by the chronologiſts. But the Julian period ſeems to be the moſt uſeful and convenient of all, it including almoſt all other æras within it, and it is a period of 7980 years; which number is compoſed by the multiplication of the three numbers, 15, 19, and 28. The firſt is the cycle of the indiction; the ſecond is the Metonic cycle of the moon; and the third is the cycle of the ſun. And the firſt year of this period was that wherein all theſe three cycles began together.

The following table gives the year of the ſeveral æras, and reduces them to the years of the Julian period, and to the years before or after the birth of Chriſt.

	Years before Chriſt.	Years of the Julian Period.
The creation of the world according to the Greek emperors	5508	
The common æra of the creation	3950	765
The beginning of the Olympiads	776	3938
The building of Rome according to Varro	753	3961
The building of Rome, according to the regiſters of the capitol	752	3962
The æra of Nabonaſſor	747	3967
The death of Alexander the Great	324	4390
	Years after Chriſt.	
The common Chriſtian epoch	1	4714
The Diocleſian æra	284	4997
The hegira of the Turks	622	5335
The jeſdegird of the Perſians	632	5345

EPODE, in lyric poetry, the third or laſt part of the ode, the ancient ode being divided into ſtrophe, antiſtrophe, and epode. See Ode, &c.

The epode was ſung by the prieſts, ſtanding ſtill before the altar, after all the turns and returns of the ſtrophe and antiſtrophe, and was not confined to any preciſe number or kind of verſes.

The epode is now a general name for all kinds of little verſes that follow one or more great ones, of what kind ſoever they be; and in this ſenſe a pentameter is an epode after an hexameter. And as every little verſe, which being put after another, cloſes the period, is called epode; hence the ſixth book of Horace's Odes is entitled, *Liber Epodon*, Book of Epodes, becauſe the verſes are all alternately long and ſhort, and the ſhort ones generally, though not always, cloſe the ſenſe of the long one.

EPOMIS, in anatomy, a muſcle, otherwiſe called deltoides. See Deltoides.

EPOPOEIA, in poetry, the ſtory, fable, or ſubject treated of in an epic poem. See Fable.

The word is commonly uſed for the epic poem itſelf. See Epic Poem.

EPULONES, in Roman antiquity, miniſters who aſſiſted at the ſacrifices, and had the care of the ſacred banquet committed to them.

EQUABLE, an appellation given to ſuch motions as always continue the ſame in degree of velocity, without being either accelerated or retarded.

EQUAL, a term of relation between two or more things of the ſame magnitude, quantity, or quality.

EQUALITY, that agreement between two or more things, whereby they are denominated equal.

The equality of two quantities, in algebra, is denoted by two parallel lines placed between them: thus, $4+2=6$, that is, 4 added to 2, is equal to 6.

EQUANIMITY, in ethics, denotes that even and calm frame of mind and temper, under good or bad fortune, whereby a man appears to be neither puffed up, or overjoyed with proſperity; nor diſpirited, ſoured, or rendered uneaſy by adverſity.

EQUANT, Æquant, or *Circle of* Equality, in aſtronomy, is a circle uſed in the Ptolemaic ſyſtem to account for the eccentricity of the planets, &c.

EQUATION, in algebra, is a propoſition wherein one quantity is declared equal to another, or where one expreſſion of any quantity is declared equal to another expreſſion of the ſame quantity: as when we ſay $\frac{2}{4}=\frac{3}{6}$; where $\frac{2}{4}$ is ſaid to poſſeſs one ſide of the equation, and $\frac{3}{6}$ the other.

An affected quadratic equation is an equation conſiſting of three different ſorts of quantities; one wherein the ſquare of the unknown quantity is concerned, another wherein the unknown quantity is ſimply concerned, and a third wherein it is not concerned at all: as if $xx-2x=3$; ſuppoſing x to be an unknown quantity.

If either the term wherein the ſimple power of x is concerned, as $-2x$, or that which is called the abſolute term, to wit, 3, be wanting, the equation is ſtill a quadratic equation, though incompleat. Some indeed there are, who rank this latter ſort of equations under the denomination of ſimple equations; and ſo ſhall we, upon account of their eaſy reſolution; though properly ſpeaking, a ſimple equation is that wherein ſome ſimple power of the unknown quantity is concerned, all others being excluded: as if $3x=6$; $2x+3=4x-5$, &c.

The uſe of theſe equations is for repreſenting more conveniently and more diſtinctly the conditions of problems, when tranſlated out of common language into that of algebra. As for example; let it be propoſed to find a number with the following property, to wit, that $\frac{2}{3}$ of it with 4 over, may amount to the ſame as $\frac{7}{12}$ of it with 9 over: here, putting x for the unknown quantity, the condition of this problem, when tranſlated out of common language into that of algebra, will be repreſented by the following equation, to wit, $\frac{2x}{3}+4=\frac{7x}{12}+9$: for $\frac{2}{3}$ of x, that is, $\frac{2}{3}$ of $\frac{x}{1}$ is $\frac{2x}{3}$; therefore $\frac{2x}{3}+4$ ſignifies $\frac{2}{3}$ of x with 4 over; and ſince this expreſſion according to the problem, amounts to the ſame with the other, to wit, $\frac{7x}{12}+9$; hence it is that we pronounce them equal to one another.

Now ſince in the foregoing equation, as well as in almoſt all others ariſing immediately from the conditions of problems themſelves, the unknown quantity is embarraſſed and entangled with ſuch as are known, the way to diſengage it from ſuch known quantities, ſo that itſelf alone poſſeſſing one ſide of the equation, may be found equal to ſuch as are entirely known on the other, that is, in the preſent caſe, to determine the value of the unknown quantity x, is what is commonly called the reſolution of an equation: for the effecting of which, ſeveral axioms and proceſſes are required; ſome whereof, namely ſuch as moſt frequently occur, I ſhall here put down; the reſt I ſhall take notice of occaſionally, as they offer themſelves.

Of the reſolution of ſimple EQUATIONS.

Axiom I. Whenever a fraction is to be multiplied by a whole number, it will be ſufficient to multiply only the numerator by that number, retaining the denominator the ſame as before. Thus $\frac{4}{5}$ multiplied into 2, gives $\frac{8}{5}$, for the ſame reaſon that 4 ſhillings multiplied into 2 gives 8 ſhillings: thus in the firſt example following, $\frac{7x}{12}$ multiplied into 3, gives $\frac{21x}{12}$.

Axiom II. But if the whole number into which the fraction is to be multiplied, be equal to the denominator of the fraction, then throw away the denominator, and the numerator alone will be the product. Thus the fraction $\frac{a}{b}$ multiplied into b, gives $\frac{ab}{b}$ or a: thus in the firſt example, $\frac{2x}{3}$ multiplied into 3, gives $2x$; and $\frac{21x}{12}$ multiplied into 12 gives $21x$.

Axiom III. If the two ſides of an equation be multiplied or divided by the ſame number, the two products, or quotients, will ſtill be equal to each other. Thus in the firſt example, where $\frac{2x}{3}+4=\frac{7x}{12}+9$; if both ſides of the equation be multiplied into 3, we ſhall have $2x+12=\frac{21x}{12}+27$; and if again this laſt equation be multiplied into 12, we ſhall have $24x+144=21x+324$.

Axiom IV. If a quantity be taken from either ſide of an equation, and placed on the other with a contrary ſign, which is commonly called tranſpoſition, the two ſides will ſtill be equal to each other. Thus if $7+3=10$, tranſpoſe $+3$, and you will have $7=10-3$: thus if $7-3=4$, tranſpoſe -3, and you will have $7=4+3$; thus if (as in the firſt example) $24x+144=21x+324$, tranſpoſe $21x$, and you will have $24x-21x+144=324$, that is, $3x+144=324$; and if again in this laſt equation you tranſpoſe 144, you will have $3x=324-144=180$.

Tranſpoſition therefore, as it is here delivered, is nothing but a general name for adding or ſubtracting equal quantities from the two ſides of an equation; in which caſe it is no wonder, if the ſums or differences ſtill continue equal to each other. As for inſtance, in this equation $a-b=c$, tranſpoſing $-b$ we have $a=c+b$: and what is this after all, but adding b to both ſides of the equation? for if b be added to $a-b$, the ſum will be a; and if b be added to c, the ſum will be $c+b$; therefore $a=c+b$: again, in the equation $a+b=c$, tranſpoſing $+b$ we have $a=c-b$, which is nothing elſe but ſubtracting b from both ſides of the equation.

The 1ſt proceſs. If, when an equation is to be reſolved, fractions be found on one, or both ſides, it muſt be freed from them by multiplying the whole equation into the denominators of thoſe fractions ſucceſſively.

The 2d proceſs. After the equation is thus reduced to integral terms, if the unknown quantity be found on both ſides the equation, let it be brought by tranſpoſition to one and the ſame ſide, viz. to that ſide, which after reduction will exhibit it affirmative.

The third proceſs. After this, if any looſe known quantities be found on the ſame ſide with the unknown, let them alſo be brought by tranſpoſition to the other ſide of the equation.

The 4th proceſs. If now the unknown quantity has any coefficient before it, divide all by that coefficient, and the equation will be reſolved.

The 5th proceſs. If the whole equation can be divided by the unknown quantity, let ſuch a diviſion be made, and the equation will be reduced to a more ſimple one. Thus in the 16th example you have $615x-7xxx=48x$; divide the whole equation by x, and you will have $615-7xx=48$. In the 13th example you have $\frac{42x}{x-2}=\frac{35x}{x-3}$; divide the whole by x, which is done by dividing only the numerators of the two fractions, and you will have $\frac{42}{x-2}=\frac{35}{x-3}$.

The 6th proceſs. If at laſt the ſquare of the unknown quantity, and not the unknown quantity itſelf, appears to be equal to ſome known quantity on the other ſide of the equation, then the unknown quantity muſt be made equal to the ſquare root of that which is known. Thus in the 14th example we have $xx=36$; therefore $x=6$, and not 18: in the 15th, we have $xx=64$; therefore $x=8$, the ſquare root of 64, and not 32, its half.

Examples of the reſolutions of ſimple EQUATIONS.

This preparation being made, I ſhall now give ſome examples of the reſolution of ſimple equations; and my firſt example ſhall be the equation given in the laſt article, in order to trace out the number there deſcribed.

Example 1.

$$\frac{2x}{3}+4=\frac{7x}{12}+9.$$

In this equation it is plain, that there are two fractions, $\frac{2x}{3}$, and $\frac{7x}{12}$, which muſt be taken off at two ſeveral operations, thus: as 3 is the denominator of the firſt fraction, multiply the whole equation by 3, and you will have $2x+12=\frac{21x}{12}+27$: again, as the denominator of the remaining fraction is 12, multiply all by 12, and you will have $24x+144=21x+324$; which is an equation free from fractions.

2dly. It muſt in the next place be conſidered, that in this laſt equation $24x+144=21x+324$, the unknown quantity is concerned on both ſides, to wit, $24x$ on one ſide, and $21x$ on the other; tranſpoſe therefore $21x$, and you will have $24x-21x+144=324$, that is, $3x+144=324$. If it be aſked why I chuſe to tranſpoſe $21x$ rather than $24x$; my anſwer is, that had $24x$ been tranſpoſed, the unknown quantity, or its coefficient at leaſt, after reduction, would have been negative, contrary to the rule in the ſecond proceſs; for reſuming the equation $24x+144=21x+324$, if $24x$ be tranſpoſed, we ſhall have $144=21x-24x+324$, that is, $144=-3x+324$: but even in this caſe, another tranſpoſition will ſet all right; for if $-3x$ be tranſpoſed in this laſt equation, we ſhall then have $3x+144=324$ as before: all that can be ſaid then againſt this laſt way is, that it creates unneceſſary tranſpoſitions, which an artiſt would always endeavour to avoid.

3dly. Having now reduced the equation to a much greater degree of ſimplicity than before, to wit, $3x+144=324$; becauſe the unknown quantity $3x$ has ſtill a looſe quantity, viz. 144 joined with it, tranſpoſe that quantity 144 to the other ſide of the equation, and you will have $3x=324-144$, that is, $3x=180$.

N. B. By a looſe quantity I mean ſuch a one as is joined with the unknown by the ſign + or —, and not by way of multiplication, as is the coefficient 3 in the laſt equation.

4thly. By this time the quantity x is very near being diſcovered; for if $3x=180$, it is but dividing all by 3, and we ſhall have $x=60$: 60 therefore is the number deſcribed in the laſt article by this property, to wit, that $\frac{2}{3}$ of it with 4 over, will amount to the ſame as $\frac{7}{12}$ of it with 9 over: and that 60 has this property, will now be eaſily made to appear ſynthetically; for $\frac{2}{3}$ of 60 is 40, and this with 4 over is 44; moreover $\frac{7}{12}$ of 60 is 35, and this with 9 over is alſo 44.

N. B. A demonſtration that proves the connection between any number and the property aſcribed to it, is either analytical or ſynthetical; if this connection is ſhewn by tracing the number from the property, the demonſtration of it is called an analytical demonſtration; but if is is ſhewn by tracing the property from the number, the demonſtration is then ſaid to be ſynthetical.

Example 2.

$$\frac{2x}{3}+12=\frac{4x}{5}+6$$

Here multiply by 3, and you will have $2x+36=\frac{12x}{5}+18$; multiply again by 5, and you will have $10x+180=12x+90$; tranſpoſe $10x$, and you will have $180=12x-10x+90$, that is, $180=2x+90$, or rather $2x+90=180$, for I generally chooſe to have the unknown quantity on the firſt ſide of the equation; tranſpoſe 90, and you will have $2x=180-90$, that is, $2x=90$; divide by 2, and you will have $x=45$.

Proof. The original equation was $\frac{2x}{3}+12=\frac{4x}{5}+6$: now if $x=45$, we have $\frac{2x}{3}=30$, and $\frac{2x}{3}+12=42$: again we have $\frac{4x}{5}=36$, and $\frac{4x}{5}+6=42$: therefore $\frac{2x}{3}+12=\frac{4x}{5}+6$, becauſe the amount of both is 42.

Of EQUATIONS *in general, and their Roots.*

Definitions —Equations are uſually denominated from the higheſt power of the unknown quantity that is alone concerned in them. Thus, if the unknown quantity ariſes to the third power, the equation is called a cubic equation; if to the fourth, a biquadratic; if to the fifth, a quadrato-cubic; if to the ſixth, a bicubic, &c. but if an equation can (by a bare reduction of the powers of the unknown quantity) be brought down to a lower form, it then receives its denomination from that form. Thus the equation $x^6-ax^3+b=0$, where x is the unknown quantity, is called a quadratic, becauſe, by ſubſtituting y for x^3, it may be reduced to one: thus again, the equation $x^6-ax^4+bxx-c=0$ is called a cubic equation, becauſe it may be reduced to one by ſubſtituting y for xx.

The root of an equation is ſuch a quantity, as being ſubſtituted for the unknown quantity, will make the two ſides equal one to the other; or, which is the ſame thing, if all the parts of an equation be thrown to one ſide, and ſo be made equal to nothing on the other, then that is ſaid to be the root of the equation, which being ſubſtituted for the unknown quantity, will make the whole equation to vaniſh. Thus the roots of the equation $xx-8x+15=0$ are 3 and 5, becauſe either of theſe numbers being put for x will make the whole equation to vaniſh; and there are no others beſides in the whole ſcale of numbers that will have that effect.

Every equation hath as many roots, poſſible and impoſſible, as there are dimentions in the higheſt power of the unknown quantity. Thus every cubic equation has three roots, every biquadratic four, &c. But it often happens that ſome of theſe roots are impoſſible, and ſometimes that they are all ſo, if the index of the higheſt power of the unknown quantity be an even number; for if it be otherwiſe, the equation will always have one root at leaſt poſſible, as will be evident from what will be ſaid hereafter when we come to treat of the conſtitution of equations. Thus the equation $x^3=1$ hath indeed three roots, but it hath but one real root, to wit, unity, the other two being impoſſible, to wit, $\frac{-1+\sqrt{-3}}{2}$ and $\frac{-1-\sqrt{-3}}{2}$. Let us ſee, however, how theſe impoſſible numbers, being ſubſtituted for x, will make $x^3=1$: and firſt let us make $x=\frac{-1+\sqrt{-3}}{2}$. Make $-1=a$, and $\sqrt{-3}=b$; then you will have $x^3=\frac{a^3+3a^2b+3ab^2+b^3}{8}$, whereof $a^3=-1$; $3aab=+3\times\sqrt{-3}=3\sqrt{-3}$: again, as $b=\sqrt{-3}$, we ſhall have $b^2=-3$, and $3ab^2=-3\times-3=+9$: laſtly, b^3, or $b^2\times b=-3\sqrt{-3}$; therefore $x^3=\frac{-1+3\sqrt{-3}+9-3\sqrt{-3}}{8}=\frac{-1+9}{8}=1$.

Let us now put $\frac{-1-\sqrt{-3}}{2}$ for x; and making $-1=a$, and $-\sqrt{-3}=b$. we ſhall have the firſt term of x^3, wherein b is not concerned, and the third term, wherein b^2 is only concerned, the ſame as before; but the ſecond and fourth terms, wherein b and b^3 are concerned, will have their ſigns changed: therefore in this caſe $x^3=\frac{-1-3\sqrt{-3}+9+3\sqrt{-3}}{8}=1$.

Of the generation of EQUATIONS.

To form an equation that has any number of given roots.—This is eaſily done, firſt by changing the ſigns of all the roots given, and then joining them ſeverally to ſome indeterminate quantity; for if the quantities thus conſtituted be multiplied all together, and the product be made equal to nothing, you will have the equation deſired. As for inſtance, let it be required to form an equation that ſhall have theſe three roots and no more, to wit, 1, 2, and 3: now, if the ſigns of theſe roots be changed, and they be ſeverally joined with the indeterminate quantity x, they will conſtitute the quantities $x-1$, $x-2$, $x-3$; multiply all theſe together, and making their product equal to nothing, you will have the equation deſired, to wit, $x^3-6xx+11x-6=0$, whoſe roots are the numbers firſt propoſed, to wit, 1, 2, and 3.

This may eaſily be tried by ſubſtituting theſe numbers (one after another) for x in the equation: but the reaſon of this method will beſt be perceived by reſolving again the equations into its firſt factors, thus, $\overline{x-1}\times\overline{x-2}\times\overline{x-3}=0$; I ſay then, that the roots of this equation are theſe three and no more, to wit, 1, 2, and 3. For firſt, if 1 be ſubſtituted for x in the equation $\overline{x-1}\times\overline{x-2}\times\overline{x-3}=0$, you will have $\overline{1-1}\times\overline{1-2}\times\overline{1-3}=0$; which muſt neceſſarily be ſo, becauſe one of the factors, to wit, $1-1$, equals 0. Make now x equal to 2 in the foregoing equation, and you will have $\overline{2-1}\times\overline{2-2}\times\overline{2-3}=0$, becauſe $2-2$ is ſo. Laſtly, make x equal to 3, and you will have $\overline{3-1}\times\overline{3-2}\times\overline{3-3}=0$, becauſe $3-3$ is ſo: therefore the three roots of this equation are the numbers 1, 2, and 3, from the very definition of a root.

Let us now ſee whether this equation can have any other roots beſides thoſe already mentioned; and, if poſſible, let r be a fourth root different from any of theſe: then if r be ſubſtituted for x in the equation, we ſhould have $\overline{r-1}\times\overline{r-2}\times\overline{r-3}=0$; but now, as r is different from any of the numbers 1, 2, and 3, by the ſuppoſition, it follows that every one of the factors, $r-1$, $r-2$, $r-3$, muſt be ſomething; and if ſo, it will be impoſſible for theſe, when multiplied together, to produce nothing; therefore the foregoing equation admits of no other roots but thoſe already mentioned.

If I would add a fourth root to the foregoing equation, to wit, -5, I might either put it thus, $\overline{x-1}\times\overline{x-2}\times\overline{x-3}\times\overline{x+5}=0$, or I might multiply the cubic equation before found, to wit, $x^3-6xx+11x-6$ by $x+5$, and ſo make the product $x^4-x^3-19xx+49x-30=0$.

Whenever an equation may be wholly divided by the ſimple power, or by the ſquare, or the cube of the unknown quantity without a remainder, it is an infallible argument that one or two or three of the roots of ſuch an equation are equal to nothing. Thus the equation $x^4-6x^3+11xx-6x=0$ may be divided by x without a remainder; whence I conclude that one of its roots is equal to nothing, as will be evident, either by ſubſtituting nothing for x in the equation, or by conſidering the equation as reſolved into its conſtituent factors thus, $x\times\overline{x-1}\times\overline{x-2}\times\overline{x-3}=0$; as if I had ſaid $\overline{x-0}\times\overline{x-1}\times\overline{x-2}\times\overline{x-3}=0$; whence it is evident that 0 has as good a title to be a root of this equation as any of the reſt.

From what has been laid down in the laſt article, it appears, that if any number of equations whoſe parts on one ſide are all equal to nothing on the other, be multiplied together, they will produce an equation of a ſuperior form, whoſe roots will be the ſame with theirs. Thus, if the following equations be multiplied together, viz. $x-1=0$, whoſe root is 1, $x-2=0$, whoſe root is 2, and $x-3=0$, whoſe root is 3, they will produce the equation $\overline{x-1}\times\overline{x-2}\times\overline{x-3}=0$, whoſe roots are 1, 2, and 3, by the laſt article. Again, let theſe equations be multiplied together, viz. $2x-3=0$, whoſe root is $\frac{3}{2}$, $4x-5=0$, whoſe root is $\frac{5}{4}$, and $6x-7=0$, whoſe root is $\frac{7}{6}$, and they will produce the equation $\overline{2x-3}\times\overline{4x-5}\times\overline{6x-7}=0$, whoſe roots are $\frac{3}{2}$, $\frac{5}{4}$, and $\frac{7}{6}$: for if $\overline{2x-3}\times\overline{4x-5}\times\overline{6x-7}=0$, we ſhall have by diviſion $\overline{x-\frac{3}{2}}\times\overline{x-\frac{5}{4}}\times\overline{x-\frac{7}{6}}=0$, and the roots of this equation are $\frac{3}{2}$, $\frac{5}{4}$, and $\frac{7}{6}$, by the laſt article. Laſtly, let theſe two equations be multiplied together, to wit, $xx-ax+b=0$, whoſe roots we will call p and q, and $xx-cx+d=0$, whoſe roots we will ſuppoſe to be r and s; I ſay then that the roots of the equation $\overline{xx-ax+b}\times\overline{xx-cx+d}=0$, will be p, q, r, s. For firſt, as p is one of the roots of the equation $xx-ax+b=0$, it follows, from the nature of a root, that if x be put equal to p, the quantity $xx-ax+b$ muſt vaniſh; but if $xx-ax+b=0$, then $\overline{xx-ax+b}\times\overline{xx-cx+d}$ muſt be equal to nothing; therefore p is one of the roots of the equation $\overline{xx-ax+b}\times\overline{xx-cx+d}=0$: and the ſame may be obſerved in all the other roots q, r, s.

Hence it is that impoſſible roots creep into equations of all orders and degrees whatever: for if the roots of one or more quadratic equations that enter into the compoſition of an equation of a ſuperior form, be impoſſible, the equation ſo formed muſt neceſſarily have the ſame impoſſible roots. And this is the reaſon why, in every equation, the number of impoſſible roots is always even; becauſe the roots of a quadratic equation muſt always be both poſſible, or both impoſſible: but if the index of the higheſt term of an equation be an odd number, it muſt have at leaſt one root poſſible, becauſe ſuch an equation cannot be formed wholly of quadratics; it muſt have a ſimple equation in its compoſition, over and above; and the root of a ſimple equation is always poſſible.

Of the coefficients of the terms of EQUATIONS.

If the roots of an equation have all their ſigns changed, and the equation itſelf be ſo ordered as that all its terms on one ſide may be equal to nothing on the other, having unity for the coefficient of its firſt term; I ſay then, that the coefficient of the ſecond term will be the ſum of all the roots thus changed, the coefficient of the third term will be the ſum of all the different products that can be made out of them by multiplying them two and two together, the coefficient of the fourth term will be the ſum of all the different products that can be obtained from them by multiplying them three and three together, the coefficient of the fifth term will be the ſum of all the different products that can ariſe by multiplying them four and four together, &c. and thus may an equation be formed that ſhall have any number of given roots without continual multiplication. As for inſtance, ſuppoſe I would form an equation that ſhall have theſe four roots, 1, 2, 3, and -5: now theſe roots, when their ſigns are changed, will be -1, -2, -3, $+5$, whoſe ſum is -1; therefore -1 will be the coefficient of the ſecond term. Again, all the different products that can be made out of them by multiplying them two and two together, are -1×-2, -1×-3, $-1\times+5$, -2×-3, $-2\times+5$, $-3\times+5$, $=+2$, $+3$, -5, $+6$, -10, -15, $=-19$; therefore the coefficient of the third term will be -19. All the different products that can ariſe by multiplying them three and three together, are $-1\times-2\times-3$, $-1\times-2\times+5$, $-1\times-3\times+5$, $-2\times-3\times+5$, $=-6$, $+10$, $+15$, $+30$, $=49$; therefore 49 will be the coefficient of the fourth term. Laſtly, there will be but one product obtainable by multiplying them all four together, that is $-1\times-2\times-3\times+5=-30$; therefore -30 will be the laſt term of the equation, and the whole equation will now be formed, to wit, $x^4-x^3-19xx+49x-30=0$.

Of the number of affirmative and negative roots in an EQUATION.

When the roots of an equation are all poſſible, and all its parts are thrown to one ſide ſo as to be made equal to nothing on the other, the number of affirmative and negative roots may be thus determined: as often as the ſigns change in paſſing from the higheſt term to the loweſt, juſt ſo many roots of the equation will be affirmative; and as often as like ſigns follow one another, ſo many will be negative. As for inſtance, in the equation $x^4-x^3-19xx+49x-30=0$, where the order of the ſigns is $+$, $-$, $-$, $+$, $-$; $+$ in the firſt term being followed by $-$ in the ſecond, argues one affirmative root; $-$ in the ſecond term followed by $-$ in the third, argues one root to be negative; — in the third term followed by + in the fourth, diſcovers another affirmative root; and + in the fourth term followed by — in the fifth, a third: ſo that if all the roots of this equation be poſſible, there will be three affirmative roots, and one negative, which is true; for the roots of this equation are +1, +2, +3, and —5, as was ſhewn in the laſt article.

This rule is uſually aſcribed to our countryman Harriott, who was undoubtedly the firſt diſcoverer of moſt of thoſe general properties of equations hitherto delivered, or to be delivered. But whoſoever it was that firſt hit upon it, this is certain, that he left no demonſtration of it; nor have I ever met with one in any treatiſe of algebra that has hitherto fallen into my hands, though moſt of them make mention of the rule. And, indeed, whoever conſiders the immenſe number of caſes that muſt neceſſarily come under conſideration in a demonſtration of this nature, will not be very ready to attempt it univerſally; I ſay univerſally, for equations of lower degrees are leſs embarraſſed, as I have ſhewn already in the caſe of quadratic equations, and ſhall farther ſhew when I come more diſtinctly to conſider cubics. On the other hand, it ſeems much more probable, that this rule was found out by experience than from any regular inveſtigation of it; for let all the roots of an equation be affirmative, as $+a$, $+b$, $+c$; then the equation will be $\overline{x-a}\times\overline{x-b}\times\overline{x-c}=0$, that is,

$$x^3\begin{array}{l}-a\\-b\\-c\end{array}xx\begin{array}{l}+ab\\+ac\\+bc\end{array}x-abc=0,$$

where there are as many changes of ſigns as there are roots. Let us now ſuppoſe all the roots of an equation to be negative, as $-a$, $-b$, $-c$; then the equation will be $\overline{x+a}\times\overline{x+b}\times\overline{x+c}=0$; that is,

$$x^3\begin{array}{l}+a\\+b\\+c\end{array}xx\begin{array}{l}+ab\\+ac\\+bc\end{array}x+abc=0,$$

where there are no changes of ſigns at all: and from the formation of equations in the laſt article it is very viſible, that theſe two extreme caſes will be the ſame, how high ſoever the equation riſes; that is, when all the roots are affirmative, there will be as many changes of ſigns as there are roots; and when none are affirmative, there will be no change at all. Now the queſtion is, whether an ingenious artiſt would not take the hint, which could not well eſcape his obſervation, and immediately ſet himſelf to try, whether in all other caſes the number of affirmative roots be not equal to the number of variations in the ſigns as they follow one another.

But here the reader ought to be put in mind, that it very often happens, eſpecially in geometrical problems, that the roots of equations are poſſible, and yet the ſchemes to which they relate may exhibit them impoſſible, upon the account of ſome limitation or other in the problem which does not enter the equation. An inſtance or two will clear up this matter.

Let A B C (plate LIII. *fig.* 5.) be a circle whoſe diameter is A C, and let A B be any chord inſcribed in it; from B, the end of the chord, draw the line B D perpendicular to the diameter A C; and let it be required, having given the lines A B and A C, to compute A D, the ſegment of the diameter intercepted between the point A and D the foot of the perpendicular. Join B C, and call A D x: then will the ſimilar triangles A D B and A B C give the following proportion, viz. AC is to A B as A B is to A D or x; whence $x=\frac{AB^2}{AC}$; therefore x, the root of this equation, will be equally poſſible, whether A B be greater or leſs than A C; but the problem will not be poſſible unleſs the chord A B be leſs than the diameter A C. Here then we have an inſtance of a problem's producing an equation whoſe root continues to be poſſible, even when the problem ceaſes to be ſo, on account of the limitation abovementioned, to wit, that in the problem, A B muſt be leſs than A C. To explain this myſtery, let A C and A B be any two given lines, and let it be required to aſſign a third proportional to them, which we will call x: ſince then A C is to A B as A B is to x, we have again $x=\frac{AB^2}{AC}$: but this problem is as unlimited as the equation it produces; for it is certain the two quantities A C and A B will admit of a third proportional, whether A B be greater or leſs than A C. The caſe then ſtands thus: here is an equation ariſing from a limited problem; but this equation is alſo intended to ſolve another problem that is abſolutely unlimited; therefore it ought not to be expected that the equation ſhould be liable to any reſtriction, whatever may be the caſe of the problem that produced it.

Of the transformation of EQUATIONS.

In order to fit and prepare equations for a more eaſy reſolution, it will be proper that the analyſt be well acquainted with all the various ways of transforming equations one into another, moſt whereof he will meet with in the following articles:

1ſt. When there are fractions in any equation, they muſt be taken away after the ſame manner as in ſimple equations, to wit, by multiplying the whole equation into all the denominators ſucceſſively: and if after this, the higheſt power of the unknown quantity is affected with any coefficient but unity, that coefficient muſt alſo be taken off in the following manner: let the equation, when reduced to integral terms, be $ax^3+bxx+cx-d=0$, where the coefficient of the higheſt power of the unknown quantity is a; then aſſuming any indeterminate quantity, as y, make $\frac{y}{a}=x$, and ſubſtituting $\frac{y}{a}$ inſtead

ſtead of x in the equation, it will ſtand thus, $\frac{y^3}{aa}+\frac{byy}{aa}+\frac{cy}{a}-d=0$; multiply the whole equation by aa, and you will then have an equation wherein the coefficient of the higheſt power of the unknown quantity is unity, to wit, $y^3+byy+acy-aad=0$; and when, by the reſolution of this equation, the value of y is diſcovered, that of $\frac{y}{a}$ or x, the root of the primitive equation, will alſo be known. Since then every equation may be reduced to another, wherein the coefficient of the higheſt power of the unknown quantity is unity, I ſhall hereafter conſider all equations in that form.

2dly. After the ſame manner may ſurd quantities be ſometimes alſo thrown out of an equation. As for inſtance, let the equation be $x^3 * +qx-\sqrt{r}=0$. Now, to get rid of the ſurd quantity $\sqrt{r}$, ſubſtitute $\frac{y}{\sqrt{r}}$ inſtead of x in the equation, and it will ſtand thus, $\frac{y^3}{r\sqrt{r}} * +\frac{qy}{\sqrt{r}}-\sqrt{r}=0$; multiply the whole equation by $r\sqrt{r}$, and you will have $y^3 * + qry-rr=0$; and when in this equation the value of y is known, that of $\frac{y}{\sqrt{r}}$ or x will alſo be known.

3dly. Thus alſo may the roots of any equation be multiplied or divided by any given number whatever. As for inſtance, let the equation be $x^3+qx-r=0$, and let it be required to multiply the roots of this equation by 3; that is, let it be required to find an equation whoſe roots ſhall be triple of the roots of this, each of each; and it may be thus done: becauſe 3 is the multiplicator, make $3x=y$, and then ſubſtituting $\frac{y}{3}$ inſtead of x in the equation, you will have $\frac{y^3}{27}+\frac{qy}{3}-r=0$; multiply all by 27, and you will have $y^3+9qy-27r=0$. In like manner may the roots of an equation be divided by 3 when occaſion requires it, to wit, by making $\frac{x}{3}=y$, and ſo ſubſtituting $3y$ inſtead of x in the equation. *Sanderſon's Algebra.*

Cubic EQUATIONS. See CUBIC *Equations.*

Quadratic EQUATIONS. See QUADRATIC *Equations.*

Conſtruction of EQUATIONS. See CONSTRUCTION *of Equations.*

EQUATION *Tranſcendental.* See TRANSCENDENTAL *Equation.*

Exponential EQUATION. See EXPONENTIAL *Equation.*

EQUATION *of a Curve.* See CURVE.

Annual EQUATION *of the Sun, Moon, &c.* See SUN, MOON, &c.

EQUATION *of Time*, in aſtronomy, the reduction of the apparent time or motion of the ſun to equable, mean, or true time. Becauſe we know no body in nature which preſerves conſtantly a perfect uniform motion; and yet ſuch a motion is only proper to meaſure equal days and hours; it is convenient to imagine ſome body or ſtar which moves in the equator eaſtward, and which never quickens or ſlackens its pace, but goes through the equator in preciſely the ſame time as the ſun finiſhes his period in the ecliptic. The motion of ſuch a ſtar will rightly repreſent equal time, and its diurnal motion in the equator will be daily 59′ 8″, the ſame as is the mean motion of the ſun in the ecliptic: and therefore the equal and middle day is to be determined by the arrival of this ſtar to the meridian, and is equal to the time in which the whole circumference of the equator or 360 degrees paſs the meridian; and beſides that 59′ 8″: and becauſe this addition of 59′ 8″ always remains the ſame, all theſe mean days will be conſtantly equal to each other.

Since the ſun goes unequally eaſtward according to the equator, ſometimes it will come to the meridian ſooner than this imaginary ſtar, and ſometimes he will touch it later than it does, and the difference is that which is between the true and apparent time. And this difference is known by having the place of the imaginary ſtar in the equator, and the point of the equator which comes to the meridian with the ſun; for the arch intercepted between them being converted into time, ſhews the difference between equal and apparent time, which is called the equation of time. And it is the time that flows, while the arch of the equator intercepted between the point determining the right-aſcenſion of the ſun, and the place of the imaginary ſtar paſſes the meridian.

Let ÆQ (Plate LIII. *fig.* 6.) be a portion of the equinoctial, E C of the ecliptic, in which imagine S to be the place of the ſun, S A a circle of declination paſſing through the ſun, and meeting with the equator in A, which will be the point which comes to the meridian with the ſun. Suppoſe m to be the place of the imaginary ſtar which performs its period in the equator with an equal motion: and when the ſun has arrived at the meridian our imaginary ſtar will be diſtant from it, by the arch m A; and if the point m be eaſtward of the point A, it will come later to the meridian than it, and the apparent time will be faſter than the mean; but if the place of the ſtar m be more weſterly than A, it will ſooner arrive at the meridian, and the apparent time is ſlower than the mean. And the arch of the equator A m converted into time is the equation, which being added to, or ſubſtracted from the apparent time gives the true, according to the point m is to the eaſt or weſt of the point A; and then we have the true time. For to know the poſition of the point A in reſpect of m, and the quantity of the arch A m, take in the equator the arch ♈ *s* or ♎ *s* equal to the ♈ S or ♎ S in the ecliptic; and then the arch *s m* will be the diſtance between the true and mean place of the ſun, which therefore is given by the ſun's anomaly; but the arch A S is the difference between the hypothenuſa ♈ S of the right-angled triangle ♈ S A, and its ſide or baſe ♈ A, which may be found by trigonometry. Moreover, the arch A *m* is equal to either the ſum or difference of the arches A *s* and *s m*; and therefore when they are known, the arch A *m* will be likewiſe known.

Moreover we muſt obſerve, that in the firſt and third quadrant of the ecliptic, the point *s* falls upon the eaſt-ſide of the point A: and therefore the arch A *s* being turned into time, is to be ſubſtracted; becauſe the point S comes later to the meridian than the point A does. But in the ſecond and fourth quadrants the point *s* is more weſterly than A, and arrives at the meridian before it: and therefore the arch A *s* turned into time is to be added, for to get the time when the point S arrives at the meridian. Suppoſe for example A *s* be two degrees, as it is when the ſun is in the 20th degree of ♈; this arch turned into time is 8 minutes: and therefore we muſt add 8′ to the apparent time, for to have the time when the point S comes to the meridian.

Moreover in the firſt ſemicircle of anomaly, that is, while the ſun in this preſent age goes from the ſeventh degree of ♋ to the ſeventh of ♑, the mean motion of the ſun is greater than its true motion; therefore then the middle place precedes the true place. And therefore in all that ſemicircle the point *m* will be to the eaſt of the point *s*; and the arch *m s* turned into time, is to be ſubtracted from the time that the point S reaches the meridian: but in the other ſemicircle of anomaly, after the ſun has left the perigæon, or rather the earth the perihelion, the mean motion is leſs than the true, and then the mean place follows the true; and conſequently the point *m* is to the weſt of the point S, and comes ſooner to the meridian than it does: and therefore the arch *m s* turned into time, is to be added to the time in which S touches the meridian. Having now the diſtance of time between the coming of the point *m* to the meridian, and the coming of the point S to the ſame; as alſo the diſtance of time between the arrivals of the points *s* and A to the meridian, we ſhall have the diſtance of time between the coming of the point *m* to the meridian, and of the point A's arrival to the ſame; that is, we ſhall have the difference between the apparent and true time, which is the equation of time.

For the equating of time the aſtronomers compoſe two tables, one for the arch *s m*, which is to be entered into with the anomaly of the ſun: and if the point *m* be weſtward of the point *s*, they mark it with + or the ſign of addition; but if it be on the other ſide, they place — or of ſubtraction. The other table is for the arch *s* A, which is the difference between the place of the ſun in the ecliptic and his right-aſcenſion. And the equations of this table are likewiſe marked with the ſigns of addition or ſubſtraction, as the point *s* is to the weſt or eaſt of the point A. The ſum of theſe two equations, if they be of the ſame kind, that is, both to be added or both to be ſubtracted; or their difference, if their affections be of different kinds, make up the abſolute equation of time.

TABLE I.

The First Part of the EQUATION OF TIME.

ARGUMENT. The Sun's mean Anomaly.

Subtract from the apparent Time.

S.	O.			I.			II.			III.			IV.			V.			
G.	′	″	diff.	′	″	diff.	′	″	diff.	′	″	diff.	′	″	diff.	′	″	diff.	
0		0,0	7,9	3	46,3	6,8	6	34,9	4,0	7	40,8	0,1	6	43,3	4,0	3	54,6	7,1	30
1		7,9	7,9	3	53,1	6,8	6	38,9	3,9	7	40,9	0,1	6	39,3	4,2	3	47,5	7,1	29
2		15,8	7,9	3	59,9	6,7	6	42,8	3,8	7	40,8	0,2	6	35,1	4,3	3	40,4	7,2	28
3		23,7	7,8	4	6,6	6,6	6	46,6	3,7	7	40,6	0,3	6	30,8	4,4	3	33,2	7,3	27
4		31,5	7,8	4	13,2	6,6	6	50,3	3,6	7	40,3	0,5	6	26,4	4,5	3	25,9	7,4	26
5		39,3	7,8	4	19,8	6,5	6	53,9	3,4	7	39,8	0,6	6	21,9	4,6	3	18,5	7,4	25
6		47,1	7,9	4	26,3	6,4	6	52,3	3,3	7	39,2	0,7	6	17,3	4,7	3	11,1	7,5	24
7		55,0	7,8	4	32,7	6,4	7	0,9	3,2	7	38,5	0,9	6	12,6	4,8	3	3,6	7,6	23
8	1	2,8	7,8	4	39,1	6,2	7	3,8	3,1	7	37,6	1,0	6	7,8	4,9	2	56,0	7,6	22
9	1	10,6	7,8	4	45,3	6,2	7	6,9	3,0	7	36,6	1,2	6	2,9	5,1	2	48,4	7,6	21
10	1	18,4	7,8	4	51,5	6,1	7	9,9	2,8	7	35,4	1,3	5	57,8	5,2	2	40,8	7,7	20
11	1	26,2	7,7	4	57,6	6,0	7	12,7	2,7	7	34,1	1,5	5	52,6	5,3	2	33,1	7,8	19
12	1	33,9	7,7	5	3,6	5,9	7	15,4	2,5	7	32,6	1,6	5	47,3	5,4	2	25,3	7,8	18
13	1	41,6	7,6	5	9,5	5,8	7	17,9	2,4	7	31,0	1,7	5	41,9	5,6	2	17,5	7,9	17
14	1	49,2	7,6	5	15,3	5,7	7	20,3	2,3	7	29,3	1,8	5	36,3	5,7	2	9,6	7,9	16
15	1	56,8	7,6	5	21,0	5,6	7	22,6	2,2	7	27,5	2,0	5	30,6	5,7	2	1,7	7,9	15
16	2	4,4	7,6	5	26,6	5,5	7	24,8	2,0	7	25,5	2,1	5	24,9	5,8	1	53,8	8,0	14
17	2	12,0	7,6	5	32,1	5,5	7	26,8	1,9	7	23,4	2,3	5	19,1	5,9	1	45,8	8,0	13
18	2	19,6	7,5	5	37,6	5,4	7	28,7	1,8	7	21,1	2,5	5	13,2	6,0	1	37,8	8,0	12
19	2	27,1	7,5	5	43,0	5,3	7	30,5	1,6	7	18,6	2,6	5	7,2	6,2	1	29,8	8,1	11
20	2	34,6	7,4	5	48,3	5,1	7	32,1	1,4	7	16,0	2,7	5	1,0	6,2	1	21,7	8,1	10
21	2	42,0	7,3	5	53,4	5,0	7	33,5	1,3	7	13,3	2,8	4	54,8	6,3	1	13,6	8,1	9
22	2	49,3	7,3	5	58,4	5,0	7	34,8	1,2	7	10,5	2,9	4	48,5	6,4	1	5,5	8,2	8
23	2	56,6	7,3	6	3,4	4,8	7	36,0	1,1	7	7,6	3,1	4	42,1	6,6		57,3	8,1	7
24	3	3,9	7,2	6	8,2	4,7	7	37,1	1,0	7	4,5	3,2	4	35,5	6,6		49,2	8,2	6
25	3	11,1	7,2	6	12,9	4,6	7	38,1	0,9	7	1,3	3,3	4	28,9	6,7		41,0	8,2	5
26	3	18,3	7,1	6	17,5	4,5	7	39,0	0,7	6	58,0	3,5	4	22,2	6,8		32,8	8,2	4
27	3	25,4	7,0	6	22,0	4,4	7	39,7	0,5	6	54,5	3,6	4	15,4	6,9		24,6	8,2	3
28	3	32,4	7,0	6	26,4	4,3	7	40,2	0,4	6	50,9	3,7	4	8,5	6,9		16,4	8,2	2
29	3	39,4	6,9	6	30,7	4,2	7	40,6	0,2	6	47,2	3,9	4	1,6	7,0		8,2	8,2	1
30	3	46,3		6	34,9		7	40,8		6	43,3		3	54,6			0,0		0
S.	XI.			X.			IX.			VIII.			VII.			VI.			G.

Add to the apparent Time.

This Part of the Equation of Time, is the Equation of the Sun's Center turned into Time.

TABLE II.

That Part of the Equation of Time ariſing from the Obliquity of the Ecliptic.

Subtract from the apparent Time.

☉ in D.	♈ ♎ ′ ″	diff ″	♉ ♏ ′ ″	diff. ″	♊ ♐ ′ ″	diff. ″	
0	0. 00		8. 23		8. 45		30
1	0. 20	20	8. 33	10	8. 35	10	29
2	0. 40	20	8. 43	10	8. 24	11	28
3	0. 59	19	8. 52	9	8. 12	12	27
4	1. 19	20	9. 1	9	8. 00	12	26
5	1. 39	20	9. 9	8	7. 47	13	25
6	1. 58	19	9. 17	8	7. 34	13	24
7	2. 18	20	9. 24	7	7. 20	14	23
8	2. 37	19	9. 30	6	7. 5	15	22
9	2. 56	19	9. 35	5	6. 50	15	21
10	3. 15	19	9. 40	5	6. 34	16	20
11	3. 34	19	9. 44	4	6. 18	16	19
12	3. 52	18	9. 47	3	6. 1	17	18
13	4. 10	18	9. 50	3	5. 44	17	17
14	4. 28	18	9. 52	2	5. 26	18	16
15	4. 46	18	9. 53	1	5. 8	18	15
16	5. 3	17	9. 54	1	4. 50	18	14
17	5. 20	17	9. 54	0	4. 31	19	13
18	5. 37	17	9. 53	1	4. 11	20	12
19	5. 53	16	9. 51	2	3. 52	19	11
20	6. 9	16	9. 49	2	3. 32	20	10
21	6. 25	16	9. 46	3	3. 11	21	9
22	6. 40	15	9. 42	4	2. 51	20	8
23	6. 54	14	9. 37	5	2. 30	21	7
24	7. 8	14	9. 32	5	2. 9	21	6
25	7. 22	14	9. 26	6	1. 48	21	5
26	7. 35	13	9. 19	7	1. 26	22	4
27	7. 48	13	9. 12	7	1. 5	21	3
28	8. 00	12	9. 4	8	0. 43	22	2
29	8. 12	12	8. 55	9	0. 22	21	1
30	8. 23	11	8. 45	10	0. 00	22	0
☉ in	♓ ♍		♒ ♌		♑ ♋		

Add to the apparent Time.

The artiſts likewiſe make a table compoſed of both the former; but it will only ſerve for a time: yet it may be uſed for a whole age without any ſenſible error; for the ſame degree of anomaly keeps nearly in the ſame degree of the ecliptic the ſpace of an age: and therefore for the ſpace of 50 years theſe two equations may be joined in one. But becauſe of the preceſſion of the equinoxes, the ſun's apogæon in proceſs of time changes its place in the ecliptic, and goes eaſterly with the fixed ſtars: and therefore in different ages the ſame degrees of anomaly will fall upon different degrees of the ecliptic: and therefore one table will not ſerve for all ages.

In the preſent age wherein we live, when the ſun is in the 10th degree of Scorpio, the point A is at its fartheſt diſtance from *m* to the weſt of it; and its diſtance then amounts to 4° 2′ 45″, and therefore the greateſt equation in time is 16′ 11″. From thence the days begin to increaſe, till the ſun comes to 22½ degree of Aquarius, where it has gone to its fartheſt diſtance from *m* eaſtward, it being there removed 3 degrees 42½ minutes; whence the greateſt equation of time is 14′ 50″: and from thence the relative motion of the point A begins again to be weſtward, till the ſun comes to the 24th degree of Taurus or the Bull; and there the point A is removed from *m* 1 degree 1½ minute to the weſt of the ſtar *m*, and the greateſt equation of time is 4′ 6″. Thence it returns again to *m*, and moves eaſterly, till the ſun comes into the 3½ degrees of the Lion, where A is diſtant from *m* 1 degree 28½ minutes, and the greateſt equation of time is 5′ 53″: and from thence its motion begins to be to the weſt, till the ſun arrives at the 10th of the Scorpion; and thereabouts it changes its courſe and goes eaſtward. It is plain, that when the points A and *m* coincide, that there the mean and apparent time muſt likewiſe coincide. Hence if we have a pendulum clock accurately and nicely fitted, and the motion of the hand ſet to equal or true time, the hand of this clock will always point out the time different from the ſolar time ſhewed by a ſun-dial; except four times a year, which is about the 4th of April, the 6th of June, the 20th of Auguſt, and the 13th of December. At all other times the hour by the ſun-dial will either be before or later than that ſhewed by the hand of the clock: and about the 23d of October the clock will differ moſt of all from the ſun, where its motion is ſlower than the ſolar time by 16′ 11″.

If you inquire in what points the equations are the greateſt, the eminent Dr. Edmund Halley, who for his great inventions is never to be mentioned by aſtronomers without honour, has given us the ſolution of this problem. But to underſtand it we muſt firſt lay down the following lemma.

LEMMA.

If any plain figure be projected orthographically on a plane; which is done by letting fall from every point of it perpendiculars on the plane of projection; the area of that projection of the figure will be to the figure projected, as the co-ſine of the inclination of the planes is to the radius.

For any figure can always be reſolved into parallelograms or triangles, whoſe baſes are parallel to the common ſection of the planes; and therefore they will be parallel to the plane on which they are projected: wherefore the baſes of theſe parallelograms or triangles, and their projections on the plane, are always equal to each other, and parallel. But the perpendiculars let fall from the ſummits or tops of the triangles and parallelograms upon the baſes, are alſo perpendicular to the common ſection of the planes, by the 29th to the firſt el. And therefore the inclination of the perpendiculars to the plane is equal to the inclination of the planesto each other. And conſequently the projections of theſe perpendiculars will be to the perpendiculars themſelves, as the co-ſine of the inclination of the plane is to the radius. Wherefore every parallelogram or triangle is projected into another, whoſe baſe is equal to the baſe of the triangle or parallelogram projected; and its height is to the height of the figure projected as the co-ſine of the inclination of the planes is to the radius. But triangles and parallelograms whoſe baſes are equal are as the perpendiculars let fall from the tops upon the baſes. The projection therefore of each triangle is to the triangle projected in a conſtant and given proportion; conſequently all the projections of all the triangles or parallelograms are to the figures projected in the ſame proportion; that is, the projection is to the figure projected as the co-ſine of the inclination is to the radius.

If the orbit of the earth be orthographically projected on the plane of the equator, by letting fall from each of its points perpendiculars, the projection will be an ellipſe, in whoſe perimeter the extremity of a right line let fall from the earth, perpendicular to the plane of the equator, will conſtantly move: and this point by its motion will mark out the right aſcenſion of the earth, or its motion according to the equator, as it is to be ſeen from the ſun; to which the right aſcenſion of the ſun ſeen from the earth is always equal. Let ♈ A ♎ C (*fig.* 7.) be the ellipſe in which the orbit of the earth is projected, S the point of projection of the ſun's center, ♈ S ♎ the common interſection of the equator and the ecliptic, A any point, where a perpendicular from the earth meets with the projection: the angle ♈ S A will meaſure the right aſcenſion of the ſun. Now I ſay, that this point A which marks out the motion of right aſcenſion, will ſo proceed in the ellipſe ♈ A ♎ C, that it will deſcribe about the point S elliptic areas proportional to the times. For in a given time let A move through the elliptic arch A B; draw the lines A S and B S; and the trilineal figure A S B will be the projection of the correſpondent area which the earth deſcribes in the plane of the ecliptic, in the ſame time, round the ſun: and therefore the projection A S B will be to the correſpondent area in the earth's elliptic orbit, as the co-ſine of the inclination of the equator and the ecliptic is to the radius. But in the ſame proportion is the whole elliptic area ♈ A ♎ C to the whole area of the earth's orbit: therefore by permutation of proportion, the trilineal figure A S B will be to the whole elliptic area ♈ A ♎ C, as the area deſcribed in the earth's orbit round the ſun is the whole area of the earth's orbit; that is, as the time in which that area in the orbit of the earth, or the area A S B in the projection, as deſcribed, is to the whole periodical time. Therefore the point A moves in the perimeter of the ellipſe at ſuch a rate, that it deſcribes about S area's that are continually proportional to the times.

The ſame things being laid down; at the center S and diſtance S A, which is a mean proportional between half the greater and half the leſſer axis of the ellipſe, deſcribe a circle; this circle will be equal to the whole elliptic area; as it is eaſy to demonſtrate from the doctrine of the conick ſections: this circle will cut the ellipſis in four points E, F, G, H, (*fig.* 8.) the points of interſection ſhew the right aſcenſions of the ſun, where the equations are greateſt. Imagine a point M to move uniformly in the periphery of the circle; its motion will then repreſent the motion of our imaginary ſtar *m*, and will deſcribe about the point S circular ſectors that are proportional to the time: and becauſe the area of the whole circle and the area of the ellipſe are equal, the areas of the elliptic ſectors and of the circular ſectors, deſcribed in the ſame time, will be conſtantly equal. Let us now ſuppoſe that the point M in the periphery of the circle, and the point that marks out the ſun's right aſcenſion in the ellipſe, be placed at the ſame time both in the right-line S L M. Let theſe points afterwards be in *m* and A, then the elliptic area L S A will be equal to the circular ſector M S *m*: and becauſe the arch M *m* is without the ellipſe, the angle M S *m* will be leſs than the angle M S A, and the difference of the angles meaſured by the arch *m* A, which is the equation of time. When the point which marks out the right aſcenſion of the ſun comes to the interſection F of the circle and ellipſe, there its angular motion round the ſun will be equal to the angular motion of the point *m*; for the areas *m* S *n* and A S F are equal, they being both deſcribed in the ſame moment of time, and at the ſame diſtance from S; and conſequently the arch *q* F is equal to the arch *m n*. In the point therefore F, the motion of right aſcenſion is equal to the motion of the imaginary ſtar, or equal to the mean motion. The ſame thing may be ſhewed at G, H and E: but it was ſhewed before, that where the motion of right aſcenſion was equal to the motion of the point *m*, that there the equations are greateſt. Wherefore in the points F, G, H and E, are the equations greateſt.

EQUATOR, in geography, a great circle of the terreſtrial globe, equidiſtant from its poles, and dividing it into two equal hemiſpheres; one north, and the other ſouth. See the article GLOBE.

It paſſes through the eaſt and weſt points of the horizon, and at the meridian is raiſed as much above the horizon as is the complement of the latitude of the place, From this circle, the latitude of places, whether north or ſouth, begin to be reckoned, in degrees of the meridian. See LATITUDE and MERIDIAN.

All people living on this circle, called by geographers and navigators the line, have their days and nights conſtantly equal.

It is in degrees of the equator that the longitude of places are reckoned; and as the natural day is meaſured by one revolution of the equator, it follows that one hour anſwers to $\frac{360}{24}=15$ degrees: hence one degree of the equator will contain four minutes of time, fifteen minutes of degree will make a minute of an hour; and, conſequently, four ſeconds anſwer to one minute of a degree.

EQUERRY, in the Britiſh cuſtoms, an officer of ſtate, under the maſter of the horſe.

There are five equerries, who ride abroad with his majeſty; for which purpoſe they give their attendance monthly, one at a time, and are allowed a table.

As to the equerries of the crown ſtable, they have this diſtinct appellation, as being employed in mounting, managing, and breaking the ſaddle-horſes for his majeſty's uſe, and holding his ſtirrup.

EQUESTRIAN STATUE ſignifies the ſtatue of a perſon mounted on horſeback.

EQUESTRIAN ORDER, among the Romans, ſignified their knights, or equites; as alſo their troopers, or horſemen in the field; the firſt of which orders ſtood in contradiſtinction to the ſenators, as the laſt did to the foot, military, or infantry: each of theſe diſtinctions was introduced into the ſtate by Romulus.

EQUIANGULAR, in geometry, an epithet given to figures whoſe angles are all equal: ſuch are a ſquare, an equilateral triangle, &c.

EQUICRURAL, in geometry, the ſame with iſoſceles. See the article ISOSCELES.

EQUICULUS, or EQUULEUS. See the article EQUULEUS.

EQUIDIFFERENT NUMBERS, in arithmetic, are of two kinds, 1. Continually equidifferent is when, in a ſeries of three numbers, there is the ſame difference between the firſt and ſecond, as there is between the ſecond and third; as 3, 6, 9. And, 2. Diſcretely equi-different, is when in a ſeries of four numbers or quantities, there is the ſame difference between the firſt and ſecond, as there is between the third and fourth: ſuch are 3, 6, 7, 10.

EQUIDISTANT, an appellation given to things placed at equal diſtance from ſome fixed point, or place, to which they are referred.

EQUILATERAL, in general, ſomething that hath equal ſides, as an equilateral angle.

EQUILATERAL HYPERBOLA, one whoſe tranſverſe diameter is equal to its parameter, and ſo all the other diameters equal to their parameters: in ſuch an hyperbola, the aſymptotes always cut one another at right-angles in the center. Its moſt ſimple equation, with regard to the tranſverſe axis, is $y^2=x^2-a^2$; and, with regard to the conjugate, $y^2=x^2+a^2$, when a is the ſemi-tranſverſe, or ſemi-conjugate. The length of the curve cannot be found by means of the quadrature of any ſpace, of which a conic ſection is any part of the perimeter. See the article HYPERBOLA.

EQUILIBRIUM, in mechanics, is when the two ends of a lever or balance hang ſo exactly even and level, that neither doth aſcend or deſcend, but keep in a poſition parallel to the horizon; which is occaſioned by their both being charged with an equal weight.

EQUIMULTIPLES, in arithmetic and geometry, are numbers or quantities multiplied by one and the ſame number or quantity. Hence, equimultiples are always in the ſame ratio to each other, as the ſimple quantities before multiplication: thus, if 6 and 8 are multiplied by 4, the equimultiples 24 and 32 will be to each other as 6 to 8.

EQUINOCTIAL, in aſtronomy, a great circle of the celeſtial globe, whoſe poles are the poles of the world.

It is ſo called, becauſe whenever the ſun comes to this circle, the days and nights are equal all over the globe; being the ſame with that which the ſun ſeems to deſcribe at the time of the two equinoxes of ſpring and autumn. See the article EQUINOX.

All ſtars, directly under this circle, have no declination, and always riſe due eaſt, and ſet full weſt. The hour circles are drawn at right angles to it, paſſing through every fifteenth degree; and the parallels to it are called parallels of declination. See the articles DECLINATION and CIRCLE.

EQUINOCTIAL *Colure*. See COLURE.
EQUINOCTIAL *Dial*. See DIAL.
EQUINOCTIAL *Hour*. See HOUR.
EQUINOCTIAL *Line*. See LINE.
EQUINOCTIAL *Occident*. See OCCIDENT.
EQUINOCTIAL *Orient*. See ORIENT.
EQUINOCTIAL *Point*, *&c.* See POINT, &c.

EQUINOX, the time when the ſun enters either of the equinoctial points, where the ecliptic interſects the equinoctial. See the preceding article.

It is ſo called, becauſe when the ſun is in theſe points, the days and nights are of an equal length all the world over. As the ſun is in one of them, in the ſpring, viz. March 20, it is called the vernal equinox; and in the other, in autumn, viz. September 23, it is called the autumnal equinox.

Preceſſion of the EQUINOXES. See the article PRECESSION.

EQUIPOLLENCE, in logic, is when there is an equivalence, or agreement, either as to the nature of things, or as to the grammatical ſenſe of any two propoſitions; that is, when two propoſitions ſignify one and the ſame thing, though they expreſs it after different manners.

EQUISETUM, horſetail, in botany, a genus of cryptogamious plants, of the order of the felices, or ferns, the fructifications of which are diſpoſed on an oblong ſpike, and are of an orbicular figure, dividing into various angles from the baſe. The plant itſelf grows in ſhady woods, and on the ſides of ditches, in ſeveral parts of England; and conſiſts of jointed ſtalks, in ſome ſpecies ſimple, in others branched, producing ſetæ, or ſmall diviſions, of the ſame ſtructure of the larger ones. Horſetail is accounted vulnerary and aſtringent, and therefore preſcribed in hæmorrhages, and injuries of the kidneys and bladder.

EQUITY, in a general ſenſe, the virtue of treating all other men according to common reaſon and juſtice, or as we would be gladly treated ourſelves, when we underſtand aright what is our due. See the article Justice.

Equity *of Redemption*, in our law, is applied to mortgages, as where money being due on a mortgage, the mortgagee is deſirous to bar the mortgager's equity of redemption, that is, his right to redeem the mortgage. In this caſe the mortgagee may oblige the mortgager, either to pay the money, or to be foreclosed of his equity of redemption. The practice is to exhibit a bill, to which anſwer being put in, and a decree obtained, a maſter of that court certifies what is due for principal, intereſt, and coſts, which is to be paid within the time limited by the decree; and thereupon, the eſtate mortgaged is to be reconveyed to the mortgager, otherwiſe, for default of payment, the mortgager is decreed to be foreclosed from all equity of redemption, and abſolutely to convey the mortgaged premiſes to the mortgagee. See Mortgage.

Equity alſo frequently ſignifies the court of chancery, where controverſies are determined according to the exact rules of equity and conſcience, by mitigating the rigour of the common law; though even by the common and ſtatute law there is alſo an equity. See the article Chancery.

EQUIVALENT, an appellation given to things which agree in nature, or other circumſtances, as force, nature, &c.

EQUIVOCAL Terms, or *Words*, among logicians, are thoſe which have a doubtful, or double meaning.

According to Mr. Locke, the doubtfulneſs and uncertainty of words has its cauſe more in the ideas themſelves, than in any incapacity of the words to ſignify them; and might be avoided, would people always uſe the ſame term to denote the ſame idea, or collection of ideas: but, adds that great man, it is hard to find a diſcourſe on any ſubject where this is the caſe; a practice which can only be imputed to folly, or great diſhoneſty; ſince a man, in making up his accompts, might, with as much fairneſs, uſe the numerical character ſometimes for one, ſometimes for another collection of unities.

Equivocal Action is, where the effect is of a different kind from the cauſe producing it.

Equivocal Cause. See Cause.

Equivocal Generation, the production of animals, without the intercourſe between the ſexes, by the influence of the ſun or ſtars, &c.

The equivocal generation of plants, is their production without ſeed, in the ordinary courſe of nature. See the article Generation.

This kind of generation is now quite exploded by the learned.

EQUIVOCATION, in ethics, the crime of wilfully uſing equivocal terms.

EQUULEUS, or Ecuuleus, in antiquity, a kind of rack uſed for extorting a confeſſion, at firſt chiefly practiſed on ſlaves, but afterwards made uſe of againſt the chriſtians.

The equuleus was made of wood, having holes at certain diſtances, with a ſcrew, by which the criminal was ſtretched to the third, ſometimes to the fourth, or fifth holes, his arms and legs being faſtened on the equuleus with cords: and thus was hoiſted aloft, and extended in ſuch a manner, that all his bones were diſlocated. In this ſtate red-hot plates were applied to his body, and he was goaded in the ſides with an inſtrument called ungula.

EQUULEI, or Equiculus, the little horſe. hiſtorians are not well agreed how this conſtellation obtained its name or place amongſt the others, nor can it be ſaid with certainty that it was any other than the famous Paculett, ſo often mentioned in the renowned hiſtory of the Seven Champions, who, after performing ſuch great actions, was by Jupiter, at the requeſt of St. George, and the fair Sabra, tranſlated to the heavens, and made a conſtellation, containing, according to the following calculation, 10 ſtars, whoſe right aſcenſion, declination, and variation is there ſettled for the year 1770.

Order.	Mag.	Name.	BayerLet.	Right Aſcenſion	Diſtance from Nor. Pole.	Var. in Right Aſcen.	Var in Declination
				° ′ ″	° ′ ″	″	″
1	5			311.33. 0	86.36.53	43.2	14.2
2	6			312.35. 3	83.45. 5	43.0	14.2
3	6			313. 8.41	85.26.18	43.0	14.0
4	6			313 22.5	84.58.29	43.1	14.1
5	4	γ		314.39.30	80.49.21	43.5	14.1
6	6			314.42. 6	80.55.11	43 2	14.2
7	4	δ		315.41. 3	80.56. 3	43.5	14.3
8	4	α		316. 3.54	85.46 17	45.9	14.4
9	6			317.17.37	83.39.16	43.2	14 6
10	4	β		317.44 26	84.12.25	44.5	14.8

EQUUS, the Horse, in zoology. See Horse.

Equus Marinus, in ichthyology, the ſame with the morſe. See Morse.

ERASED, in heraldry, the ſame with arrache. See the article Arrache.

ERECT Flowers, ſuch as grow upright without hanging or reclining the head. See the article Flower.

ERECT DIAL. See the article DIAL.

ERECT VISION. See the article VISION.

ERECTOR CLITORIS, in anatomy, one of the two muſcles of the clitoris that ſerve for its erection.

The erectores of the clitoris ariſe from the oſſa iſchii, and are inſerted into the corpora cavernoſa.

ERECTOR PENIS, one of the two muſcles of the penis, that ſerve for its erection.

Theſe ariſe on each ſide, from the oſſa iſchii between the tubercle of this bone and the beginning of the corpus cavernoſum, and each of them is inſerted into the corpus cavernoſum of its own ſide. Theſe muſcles, when they act together, preſs the veins of the back of the penis againſt the oſſa pubis, by which they prevent the reflux of blood from the penis; and conſequently, when at the ſame time the blood flows impetuouſly into the parts by the arteries, and cannot get back this way, the penis becomes erected.

ERICA, heath, in botany, a genus of plants, whoſe flower conſiſts of a monapetalous campanulated corolla, containing eight capillary filaments topped with bifid antheræ; the fruit is a roundiſh quadrilocular capſule containing a great number of very ſmall ſeeds. Theſe plants grow wild upon barren and uncultivated places in ſeveral parts of England, and are much uſed for brooms, as the pliableneſs of the branches, which are alſo tough and fine, makes them very fit for that purpoſe. The diſtilled waters of heath flowers is by ſome recommended for ſore eyes, as alſo for the cholic; and fomentations of them are ſaid to be good in the gout and paralytic diſorders.

ERIDANUS, or FLUMEN, in aſtronomy, a conſtellation of the ſouthern hemiſphere, which was originally ſuppoſed to be the Nile, though the Romans turned it into Eridanus: and it is repreſented on the globe to wander ſeveral different rays. It runs up north to one of the Piſces, and according to the ancient Farneſe globe, ſhould certainly go to the other, and by Andromeda's head; but the line in that part is defaced by time, or ſome accident or other.

Its chief courſe is by the Sea-monſter, from which it goes to Orion's legs in one ſtream; as it falls from it in another very ſerpentine one toward the Antartic-pole: the chief thing to be obſerved is, that it is very irregular and winding.

The fabulous ſtories of the poets concerning this river are various. Some call it Padus, and ſay that it was placed in heaven in remembrance of Phaeton, who ſet fire to the whole world by reaſon of his miſguiding the chariot of his father Phæbus, and was ſlain with a thunder bolt by Jupiter, and tumbling headlong down from heaven fell into the river Eridanus or Padus, which the Italians call Po. Others call it Flumen Orionis, or the flood of Orion, and ſay it was placed there to betoken the offspring from whence he came: for according to the poets, it is thus reported concerning his birth or origin.

Jupiter, Neptune, and Mercury, once being in a frolickſome humour, travelled together on the earth in the likeneſs of men, and being overtaken with night, were requeſted by one Hyreus, a farmer and grazier, to take a lodging at his houſe: to whoſe requeſt the gods readily yielded. The good old Hyreus, who was of a hoſpitable and friendly diſpoſition, killed an ox, that he might the better entertain his new gueſts, and make them welcome. The gods ſeeing the good heart of the old gentleman and his wife, ordered him to demand whatever he thought proper in recompence for his friendly cheer. Hyreus and his wife being old, requeſted of the gods to gratify them with a ſon. The gods, to fulfill their deſire, called for the hyde of the ox that was ſlain, which being brought, they put it into the earth, and all three of them made water into it together, and then covered it up, and ordered Hyreus to dig it up in nine months afterwards, which he did, and found therein a man child, whom he called Ourion ab Urina, of piſs; though afterwards omitting the ſecond letter he was named Orion. Therefore at the time he was placed in heaven, this flood was joined hard to his heels; and the ox hide, wherein the gods did piſs, was placed in his hand in memorial of his offspring. The ſtars in this conſtellation are ſixty-nine, whoſe right aſcenſion, declination, &c. are as follow:

Order	Magn.	Name.	Bayer Let	Right Aſcenſion.	Diſtance from Nor. Pole.	Var. in Right Aſcen.	Var. in Declination.
				° ′ ″	° ′ ″	″	″
1	4	1^{ma} ad	τ	38.27.47	109.35 48	40. 0	15.5.
2	4	2^{da} ad	τ	39. 2. 1	112. 0. 2	39. 2	15 4
3	3		y	41.18. 3	99.49.27	43. 8	15.1
4	6			41 39 41	114.49 58	38. 1	15.0
5	6			41.54.50	93.25.48	43. 1	15.0
6	6			41.49.58	114.34.40	38. 2	15.0
7	6			42.11.18	93.50.31	43. 1	14.9
8	6	1^{ma} ad	ρ	42.21. 5	98.36.58	42. 0	14.7
9	5	2^{da} ad	ρ	42.45. 4	98.38.44	42. 0	14.6
10	4	3^{tia} ad	ρ	43. 8.16	98.33 52	43. 0	14.2
11	3.4			43. 8.48	114.34.32	38. 0	14 1
12	3			45.34.26	119.54.32	37. 9	14 0
13	3		ζ	46. 3.14	99.33 38	43. 4	13.9.
14	6			46.14.38	100. 3. 4	41. 4	13.8
15	6			46.55.33	113.22.58	38. 0	13.6
16	4			47.11.55	112.38.42	38. 2	13.2
17	4.5			49 48.12	95.52.45	44. 5	13.0
18	3.4		ε	50.25.40	100.16.55	43. 2	12.7
19	4			50.47.39	112.27.53	38. 0	12.6
20	5.6			51.20.51	108.26.17	39. 0	12.5
21	6			51.47.17	96.24. 4	42. 2	12.3
22	5.6			52.11. 5	95.59.36	42. 2	12.2

Order.	Magn.	Name.	Bayer Let.	Right Ascenſion.	Diſtance from Nor. Pole.	Var. in Right Aſcen.	Var. in Declination.
				° ′ ″	° ′ ″	″	″
23	3.4		δ	55. 3.44	100.33.32	43. 1	12.0
24	5			53. 4. 1	91.55. 2	43. 2	12.0
25	6			53.10. 5	91. 4.18	43. 3	11.9
26	4		π	53.41.41	102.51.44	40. 2	11.8
27	4			54. 8.38	113.57.24	37. 0	11.7
28	6.5			54.20.26	114.37.37	37. 0	11.6
29	6.7			55. 9.27	96.47.13	44. 2	11.5
30	5 6			55.12.22	96. 5.19	42. 1	11.4
31	5.6			55.26.22	96. 0.34	42. 1	11.3
32	4.5			52.32.39	93.40.42	43. 0	11.2
33	4.5			55.52.18	115.19.45	36. 2	11.1
34	2		γ	56.49.25	104.10.36	41. 9	11.1
35	5			57.20.46	92.14.29	43. 2	10.9
36	4			57.25.59	114.42.24	36. 3	10.6
37	6			59.40. 2	97.33.41	42. 0	10.2
38	3 4		ο	60. 2. 5	97.28.42	41. 4	10.0
39	5		A	60.45.18	100.52.50	41. 0	10 0
40	5		*d*	61. 5 42	77.58.37	42. 0	9.5
41	4.3			62.10.31	124.23.52	32. 2	9.4
42	4.3		ξ	62.56.21	94.18.44	44.50	9.3
43	5			63.41.42	124.33.46	32. 2	9 0
44	5.6			64. 3 19	89.10.23	44. 1	8.9
45	5.6			64.55.28	90.34.42	44. 0	8.6
46	5			65.33.16	97.14.36	42. 0	8.5
47	4			65.39.50	98.45. 8	42. 0	8.3
48	4		ν	66. 4.45	93 49.18	43. 0	8.0
49	5.6			66.11. 5	89.30.37	44. 1	7.9
50	4	1^ma^ ad	υ	65.59.44	120.15. 4	34. 0	7.8
51	4		*c*	66.22.19	92.58.16	41. 0	7.6
52	3	2^da^ ad	υ	66.32.39	121. 3.40	33. 2	7.5
53	3.4			66.46.33	104 47. 0	,9. 2	7.4
54	3.4			67.29. 2	110. 8.48	37. 2	7.3
55	6			68. 1. 5	99 15.40	41. 0	7.2
56	6			68. 8.13	98.53. 9	41. 1	7.1
57	4		μ	68.22.45	93.42.15	43. 0	7.0
58	5.6			69.16.29	107.23. 4	41. 2	7.0
59	6			69.26.34	106.46. 0	39. 0	6.9
60	6			69.51. 6	106.39.31	39. 0	6.8
61	5		ω	70.16.20	95.52.34	42. 1	6.6
62	6		*b*	71. 8. 9	95 33.46	42. 1	6.4
63	6			72. 7.22	100.37.53	40. 3	6.3
64	6			72.12. 0	102.54.23	40. 0	6.0
65	5		φ	72.27. 8	97.32.34	41. 3	5 9
66	6			73.23. 1	94.59.41	42. 2	5.6
67	3		*h*	74. 8.28	95,24. 2	44.33	5.5
68	6			74.12 38	94 44.56	42. 2	5.2
69	4		λ	74.25. 7	95. 4.43	41. 0	5.0

ERIGERON, in botany, a genus of plants producing compound radiated flowers, compoſed of hermaphrodite and female corollulæ; the hermaphrodite are funnel-ſhaped, and cut at the top into five parts, with five hairy ſtamina; the female florets are ligulated, linear, and ſubulated, and compoſe the rays: the fruit has no pericarpium, but the cup, which is connivent, contains the ſeeds, which are oblong, ſmall, and crowned with a long down. This genus includes the conyzoides and conyzella of Dillenius.

ERINUS, in botany, a genus of plants whoſe flower is of the ringent kind, and contains four ſhort didynamious ſtamina. The fruit is an ovate bilocular capſule, covered by the cup, and contains a great number of ſmall ſeeds. This genus includes the ageratum of Tournefort.

ERIOCEPHALUS, in botany, an evergreen plant with a ſhrubby ſtalk, furniſhed with white woolly leaves, which are digitated, and are of a ſtrong ſmell when bruiſed; the flowers, which are compound and radiated, are produced in ſmall cluſters at the extremity of the branches, and are compoſed of hermaphrodite and female corollulæ; the hermaphrodite, which compoſe the diſk, are funnel-ſhaped, and the female ones, being five in number, are ligulated in the radius; the hermaphrodite florets are barren, but each of the female are ſucceeded by a ſingle, roundiſh, naked ſeed, reſting on a plain receptacle.

ERIPHORUM, in botany, a genus of triandrious plants, whoſe flower is deſtitute of a corolla, the calyx is an imbricated ſpike, with oval oblong ſquamæ, the ſeed is triguetrous, ſharp pointed, and furniſhed with hairs longer than the ſpike.

ERITHALIS, in botany, a genus of plants whoſe flower is monopetalous, and contains five ſubulated filaments, topped with oblong antheræ; the fruit is a globoſe coronated berry, with ten cells, containing a number of ſmall ſeeds.

ERMIN, *Erminium*, in zoology, a creature whoſe ſkin is the ermin, ſo much eſteemed as a fine fur.

This creature is properly a ſpecies of weaſel, and is called by Mr. Ray, and other authors, muſtela candida, the white weaſel, and is in all reſpects like the common weaſel, and is all over of a pure ſnow-white, except the tip of the tail, which is of as beautiful a black; and it has a little yellowiſh grey about the eyes, and a mark, or ſpot, of the ſame colour, on the head, another on the ſhoulders, and a third near the tail. Its colour is, however, very different in degree and elegance, according to the ſeaſon of the year. It is frequent about rivers, and in meadows, in thoſe countries which produce it, and feeds on moles, mice, and other ſmall animals.

ERMIN, in heraldry, is always argent and ſable, that is, a white field, or fur, with black ſpots. Theſe ſpots are not of any determinate number, but may be more or leſs, at the pleaſure of the painter, as the ſkins are thought not to be naturally ſo ſpotted; but ſerving for lining the garments of great perſons, the furriers were wont, in order to add to their beauty, to ſow bits of the black tails of the creatures that produced them, upon the white of their ſkin, to render them the more conſpicuous, which alteration was introduced into armory.

Ermin, or Ears of Corn, an order of knights in France, inſtituted by Francis the laſt of that name, duke of Brittany.

ERMINE', or croſs erminé, is one compoſed of four ermin ſpots.

It is to be obſerved, that the colours in theſe arms, are not to be expreſſed, becauſe neither this croſs, nor theſe arms, can be of any other colour but white and black.

ERMINES are, by ſome Engliſh writers, held to be the reverſe of erminé, that is, white ſpots on a black field, and yet the French uſe no ſuch word, but call this black powdered with white *contre ermin*, which is very proper, as it denotes the reverſe of ermin. See the article Ermin.

ERMINITES ſhould ſignify little ermines, but it is otherwiſe; for it expreſſes a white field powdered with black, only that every ſuch ſpot hath a little red hair on each.

Erminites alſo ſignify a yellow field powdered with black, which the French expreſs much better by *or ſemée d'ermine de ſable.*

EROSION, among phyſicians, denotes much the ſame with corroſion, only in a ſtranger degree. See the articles Corrosion and Corrosives.

ERRATA, a liſt of the errors or faults in the impreſſion of a book, generally placed at the beginning thereof.

ERRATIC, in general, ſomething that wanders, or is not regular: hence it is, the planets are called erratic ſtars; as thoſe fevers, which obſerve no regular periods, are denominated erratic fevers.

ERRHINES, ερρινα, in pharmacy, medicines which, when ſnuffed up the noſe, promote a diſcharge of mucus from that part.

The excretion of the mucus lymph is excellently promoted by errhines and ſternutatories, the former of which ſtimulate the pituitary coats but gently, whereas the latter more forcibly ſtimulate them to an excretory motion. See the article Sternutatory.

ERROUR, Error, in philoſophy, a miſtake of our judgment, giving aſſent to that which is not true.

Mr. Locke reduces the cauſes of error to theſe four; firſt, want of proofs; ſecondly, want of ability to uſe them; and, thirdly, want of will to uſe them; and fourthly, wrong meaſures of probability.

ERUCA Rocket, in botany, a plant with a white, woody, ſlender, root, and hairy ſtalks. The leaves are pinnated and lacinated. The flowers are cruciform and ſtriped: and the ſeed are roundiſh.

The ſmell of this plant is ſtrong and ungrateful; as is alſo the taſte. It is ſaid to excite the appetite, and help digeſtion, to ſtrengthen the ſtomach, and to promote urine.

This plant is claſſed by Linnæus among the braſſicas or cabbages, which ſee.

ERVUM, bitter vetch, in botany, a genus of plants producing papilionaceous flowers. The vexillum plane, roundiſh and ſlightly reflexed. The alæ are obtuſe, and ſhorter by half than the vexillum: and the carina is ſhorter than the alæ, and acuminated.

The fruit is a thick, knotty, obtuſe and oblong pod, containing four roundiſh ſeeds.

The ground ſeeds of a ſpecies of this genus abounds with a diuretic ſalt, and is therefore recommended for the ſtone.

ERUCTATIONS, in medicine, are the effects of flatulent foods, and the crudities thence ariſing. See Flatulency.

ERUDITION, *eruditio*, denotes an extenſive acquaintance with books, eſpecially ſuch as treat of the Belles Lettres.

ERUPTION, in medicine, a ſudden and copious excretion of humours, as pus or blood: it ſignifies alſo the ſame with exanthema, any breaking-out, as the puſtules of the plague, ſmall-pox, meaſles, &c.

ERYNGIUM, Eryngo, or ſea-holly, in botany, a genus of plants whoſe flowers are placed on one common receptacle. The general corolla is uniform and roundiſh: and the floſcule, which compoſes it, conſiſts each of five oblong petals knotted together by a longitudinal line, including five capillary ſtamina.

The fruit is of an oval figure, divided into two parts, each having one oblong taper ſeed.

The common eryngium grows in plenty on ſandy and gravelly ſhores in ſeveral parts of England; the roots of which are uſed in medicine; and are reckoned hepatic, rephretic and alexipharmic. Their whole virtue conſiſts in the external or cortical parts,

ERYSIMUM, hedge-muſtard, in botany, a genus of plants whoſe flower conſiſts of a tubulous cup, containing four oblong cruciform petals, with very obtuſe points, and ſix ſtamina.

The fruit is a long, linear, four cornered pod, with two cells, filled with ſmall round ſeeds.

The common eryſimum, which is uſed in medicine, grows in great plenty in many parts of England, and flowers in July or Auguſt. It is biting and pungent, not much unlike common muſtard; and in like manner, it is aperient and diſcuſſive. It is preſcribed chiefly in aſthmas, in farctions of the lungs and chronical coughs: for it not only diſſolves the viſcid matter in the lungs, but alſo in the ſtomach and inteſtines; whence it is good in cholics proceeding therefrom. It is alſo ſaid to expel poiſon, deſtroy worms, and cure ulcers in the mouth.

ERYSIPELAS, otherwiſe called St. Anthony's fire, is that ſpecies of inflammation, which ariſing in the ſkin, and its ſubjacent far, ſometimes ſpreads itſelf very far, and is accompanied with redneſs, heat, and pain. The part affected, when preſſed with the finger, becomes remarkably white; but ſoon after its removal, reſumes its former redneſs.

The word is Greek, ερυσιπελας, and derived from ερυθρος, red, and πελος, livid; becauſe of the colours it induces on the affected part.

ERYTHRINA, coral tree, in botany, a genus of plants whoſe flower conſiſts of a papilionaceous pentapetalous corolla; the fruit is a very long pod, protuberated by the ſeeds terminating in a ſmall point, and conſiſting of one cell, which is filled with kidney-ſhaped ſeeds.

This genus includes the corallodendrum of Tournefort, and the coral of Dillerius; but being ſomewhat tender, they require a hot-houſe in this country, particularly to produce their flowers, which grow in ſpikes, and are of a beautiful ſcarlet colour.

Theſe plants are beſt propagated by ſowing their ſeeds in the ſpring on a hot-bed, and afterwards tranſplanted ſingly into pots, and plunged into the bark-bed in the ſtove.

ERYTHROIDES, in anatomy, the firſt part of the proper tunics or coats which cover the teſticles. See TESTICLE.

ERYTHRONIUM, dog's-tooth violet, in botany, a genus of plants whoſe flower conſiſts of ſix oblong lanceolated reflexed petals, ſpreading open at their baſe with ſix filaments topped with oblong erect furrowed antheræ, the fruit is a ſubgloboſe capſule, with three cells, including a number of ovate acuminated ſeeds.

The root is recommended againſt the cholic, epilepſy, and worms; it is alſo reckoned a provocative to venery.

This genus comprehends the dens canis of Tournefort.

ERYTHROXYLON, in botany, a genus of plants, whoſe flower conſiſts of five ovate concave patent petals, with ten filaments topped with heart-ſhaped antheræ; the fruit is an egg-ſhaped unilocular drupe, containing an oblong quadrangular nut.

ESCALADE, or SCALADE, in the art of war. See the article SCALADE.

ESCAPE, in law, a violent or privy evaſion out of ſome lawful reſtraint, without being delivered by due courſe of law.

ESCAPE-WARRANT, a proceſs which iſſues out againſt a perſon committed in the King's-bench or Fleet-priſons, that, without being duly diſcharged, takes upon him to go at large.

Upon this warrant, which is obtained on oath, a perſon may be apprehended on a Sunday.

ESCHALOT, or SHALLOT, a ſpecies of the onion, much uſed in cookery. See ONION.

ESCHEAT, in law, ſignifies any lands or tenements that caſually fall to a lord within his manor, by way of forfeiture, or by the death of his tenant, without heirs general or ſpecial.

ESCHRAKITES, in matters of religion, a ſect of Mahometans, who believe that man's ſovereign good conſiſts in the contemplation of God. They avoid all manner of vice, and appear always in good humour, deſpiſing the ſenſual paradiſe of Mahomet. The moſt able preachers in the royal moſques are of this ſect.

ESCLATTE, in heraldry, ſignifies a thing forcibly broken, or rather a ſhield that has been broken and ſhattered with the ſtroke of a battle-ax.

ESCORT, in the art of war, the ſame with convoy. See the article CONVOY.

ESCULENT, an appellation given to ſuch plants or the roots of them, as may be eaten as food; ſuch are cabbages, onions, carrots, turnips, parſnips, potatoes, radiſhes, &c.

ESCULUS, or ŒSCULUS, the horſe-cheſnut, in botany. See the article HORSE-CHESNUT.

ESCUTCHEON, or SCUTCHEON, in heraldry, is derived from the French *eſcuſſon*, and that from the Latin *ſcutum*, and ſignifies the ſhield whereon coats of arms are repreſented.

Moſt nations, of the remoteſt antiquity, were wont to have their ſhields diſtinguiſhed by certain marks painted on them; and to have ſuch on their ſhields was a token of honour, none being permitted to have them till they had performed ſome honourable action.

The eſcutcheon, as uſed at preſent, is ſquare, only rounded off at the bottom.

As to the bearings on ſhields, they might at firſt be arbitrary, according to the fancy of the bearer, but, in proceſs of time, they came to be the gift of kings and generals, as the reward of honourable actions.

ESCUTCHEON *of Pretence*, that on which a man carries his wife's coat of arms, being an heireſs, and having iſſue by her. It is placed over the coat of the huſband, who thereby ſhows forth his pretenſions to her lands.

ESDRAS, the name of two apocryphal books, uſually bound up with the ſcriptures. They were always excluded the Jewiſh canon, and are too abſurd to be admitted as canonical by the papiſts themſelves. The firſt book is chiefly hiſtorical, giving an account of the return of the Jews from the Babyloniſh captivity, and the building of the ſecond temple; the ſecond is written in the prophetical way, pretending to viſions and revelations, but ſuch as are extremely ridiculous.

ESLIRASS, in law, perſons particularly appointed or choſen to impannel juries.

ESNECY, in law, a private prerogative allowed to the eldeſt coparcener, where an eſtate is deſcended to daughters for want of an heir male, to chooſe firſt, after the eſtate of inheritance is divided.

ESPALIERS, in gardening, are rows of trees planted in gardens, either to encloſe particular quarters of a garden, or the whole; the trees are moſt commonly fruit bearing, as apples, pears, or plumbs, theſe are trailed flat either to ſtakes or lattice work, and anſwers the purpoſes of breaking the winds from tender plants, hiding from the eye thoſe crops which appear unſightly, and producing handſome fruit; their diſtance to be planted may be ten or twelve feet, but this depends on the ſort and the richneſs of the ſoil: while the trees are young, it will be ſufficient to drive a few ſtakes into the ground, to which the branches ſhould be trained in an horizontal direction, as they are produced; afterward the eſpalier ſhould be made for good, and the trees regularly pruned, trained, and faſtened to it. Hardy fruit-trees, well managed by this method, are much preferable to thoſe trained up in any other figure, upon ſeveral accounts, as theſe take up but little room in a garden, ſo as to be hurtful to the plants which grow in the quarters; likewiſe, the fruit upon theſe are better taſted than thoſe which grow upon dwarfs, the ſun and air having freer acceſs to every part of the tree, whereby the damps ariſing from the ground is ſooner diſſipated, which is of ſingular advantage to fruit trees (as hath been ſhewn under the article BLIGHT). Alſo trees againſt an eſpalier, by being kept low and the branches faſtened, the fruit is not ſo liable to be blown off by the wind, therefore it muſt be allowed that eſpaliers are of conſiderable uſe as well as beauty.

ESPLANADE, in fortification, the ſloping of the parapet of the covert-way towards the campaign.

ESPOUSALS, in law, ſignify a contract or promiſe made between a man and a woman, to marry each other.

ESQUIRE, *Armiger*, was anciently the perſon that attended a knight in time of war, and carried his ſhield.

ESSAY, in coinage, See the article ASSAY.

ESSAY, in literature, a peculiar kind of compoſition, the character of which is to be free, eaſy, and natural; not tied to ſtrict order or method, nor worked up and finiſhed like a formal ſyſtem.

ESSAY-HATCH is the miner's term for a little trench or hole, which they dig to ſearch for ſhoad or ore.

ESSENCE is that which conſtitutes the peculiar nature of any thing, and makes it to be what it is.

In philoſophy, the eſſence of a thing is that which is the primary conception which one has of it, and is diſtinguiſhed from its act, which is called its exiſtence. Thus the eſſence of a rectilinear triangle conſiſts in its being bounded by three ſtraight lines; of a circle, in that its radii or ſemi-diameters are all equal; and the eſſence of a ſquare is, that it hath four right angles and four equal right-lined ſides.

ESSENCE, in chemiſtry, is the moſt pure, balſamic, and ſubtile parts, which have been extracted from any body by means of fire.

ESSENES, or ESSENIANS, in Jewiſh antiquity, one of the three ancient ſects among that people, who outdid the phariſees in their moſt rigorous obſervances. They allowed a future ſtate, but denied a reſurrection from the dead. Their way of life was very ſingular: they did not marry, but adopted the children of others, whom they bred up in the inſtitutions of their ſect: they deſpiſed riches, and had all things in common; and never changed their cloaths, till they were entirely worn out. When initiated, they were ſtrictly bound not to communicate the myſteries of their ſect to others; and if any of their members were found guilty of any enormous crimes, they were expelled.

Pliny tells us, that they dwelt on the weſt ſide of the lake of Aſphaltites; that they were a ſolitary kind of men, living without women or money, and feeding upon the fruit of the palm-tree: he adds, that they were continually recruited by new comers, whom the ſurges of ill fortune had made weary of the world; in which manner the ſect was kept up for ſeveral thouſands of years, without any being born among them. The reaſon why we find no mention made of them in the New Teſtament, may be their recluſe and retired way of life, no leſs than their great ſimplicity and honeſty, whereby they lay open to no cenſure or reproof.

ESSENTIA, ESSENCE, See the article ESSENCE.

ESSENTIAL, ſomething neceſſarily belonging to the eſſence or nature of a thing, from which it cannot be conceived diſtinct: thus the primary qualities of bodies, as extenſion, figure, number, &c. are eſſential or inſeparable from them in all their changes and alterations. See the article QUALITY.

ESSOIN, in law, an excuſe for a perſon ſummoned to appear and anſwer to an action on account of ſickneſs or other juſt cauſe of his abſence.

ESSOIN-DAY is regularly the firſt day of every term, though the fourth day after is alſo allowed by way of indulgence.

ESSORANT, in heraldry, denotes a bird ſtanding on the ground with its wings expanded, as if it had been wet, and were drying itſelf.

ESTABLISHMENT *of Dower*, in law, an aſſurance of dower made to the wife by the huſband, or ſome friend of his, on marriage.

ESTATE, in law, ſignifies the title or intereſt that a perſon has in lands, tenements, or other effects; comprehending the whole in which a perſon hath any property, and will paſs the ſame.

ESTATES, in a political ſenſe, is uſed either to denote the dominions of ſome prince, or the general claſſes into which the people are divided.

ESTETE, in heraldry, denotes the heads of beaſts torn off by main force.

ESTHER, a canonical book of the Old Teſtament, containing the hiſtory of a Jewiſh virgin, dwelling with her uncle Mordecai at Shuſhan, in the reign of Ahaſuerus, one of the kings of Perſia.

ESTOILEE, or Cross-Estoilee, in heraldry, a ſtar with only four long rays in form of a croſs; and accordingly, broad in the center, and terminating in ſharp points.

ESTOPPEL, in law, an impediment or bar to an action, which ariſes from a perſon's own fact; or rather, where he is forbid by law to ſpeak againſt his deed, which he may not do, even to plead the truth.

ESTOVERS, in law, is moſt generally taken for certain allowances of wood made to tenants, as houſe-bote, hedge-bote, and plough-bote; which three are comprehended under reaſonable eſtovers.

ESTRANGEL, Estrangelus Character, in the Syriac grammar, a particular ſpecies or form of Syriac letters, ſerving as the majuſculæ letters of that language, and by ſeveral ſuppoſed to be the true ancient Chaldee character.

ESTRAY, in law, any beaſt, not wild, that is found within a lordſhip, and owned by no-body: in which caſe, being cried according to law in the two next market towns adjacent, and not claimed in a year and a day by the owner, it becomes the property of the lord of the manor or liberty wherein it was found.

ESTREAT, in law, a true copy, note, or duplicate of an original writing or record, eſpecially fines, amercements, penalties, &c. ſet down and impoſed in the rolls of a court, to be levied by the bailiff, or other officer.

ESTREPEMENT, in law, any ſpoil made by tenants for life on any lands, &c. to the prejudice of the reverſioner: it is alſo taken to ſignify the making land barren, by continual ploughing and ſowing, and thereby drawing out the heart of the ground without manuring, or rather good huſbandry, by which means it is impaired.

It may likewiſe be applied to the cutting down of trees, or lopping them farther than the law allows.

ESURINE Salts, ſuch as are of a corroding, fretting, and eating nature; abounding chiefly in places near the ſea-ſide, and where great quantities of coals are burnt, as appears from the ſpeedy ruſting of iron bars in the windows of houſes built in ſuch places.

ETAPPE, a term uſed in the French armies, for the proviſions and forage allowed an army in their route through a kingdom, whether going into winter quarters, or returning to take the field. Hence, etapier is the undertaker or perſon who contracts with the country or territory for furniſhing the ſaid proviſions.

ETCHING, a method of engraving on copper, in which the lines or ſtrokes, inſtead of being cut with a tool, or graver, are eaten in with aquafortis.

ETERNITY, an attribute of God, expreſſing his infinite or endleſs duration. See the article God.

ETHICS, or Morality, the ſcience of manners or duty, which it traces from man's nature and condition, and ſhews to terminate in his happineſs; or, in other words, it is the knowledge of our duty and felicity, or the art of being virtuous and happy.

ETHIOPIC Year. See the article Year.

ETHMOIDAL, in anatomy, is applied to one of the common ſutures of the ſkull, which goes round the os ethmoides, from which it derives its name, and which ſeparates it from the bones in contact with it.

ETHMOIDES, is an epithet applied to a bone at the root of the noſe, called alſo os ethmoides. See Cranium.

The word is Greek, *ηθμοειδης*, which is derived from *ηθμος*, a ſtrainer, and *ειδος*, form or likeneſs.

ETHNOPHRONES, in church hiſtory, heretics of the ſeventh century, who, profeſſing Chriſtianity, joined thereto all the ceremonies and follies of paganiſm, ſuch as judicial aſtrology, divinations of all kinds, &c. and who obſerved all the feaſts, times, and ſeaſons of the Gentiles.

ETHOPOEIA, or Ethology, in rhetoric, a draught, or deſcription, expreſſing the manners, paſſions, genius, tempers, aims, &c. of any perſon.

ETYMOLOGY, that part of grammar which explains the derivation of words, in order to arrive at their firſt and primary ſignification.

The word is formed of the Greek, *ετυμος*, true, and *λεγω*, to ſay. Hence Cicero calls it *notatio* and *verilogium*. Quintilian calls it *originatio*.

EVACUANTS, in medicine, are properly ſuch things as diminiſh the animal fluids by throwing out ſome morbid or redundant humour; or ſuch as thin, attenuate, and promote the motion and circulation thereof.

The word is Latin, from *evacuo*, to empty or clean.

EVACUATION, in phyſic, the art of diminiſhing, emptying, or attenuating the humours of the body.

EVANGELISTS, at preſent, is confined to the writers of the four goſpels, St. Matthew, St. Mark, St. Luke, and St. John. The apoſtle Paul, enumerating the ſeveral orders of Chriſtians, according to the gifts beſtowed on them, reckons evangeliſts in the third place, after apoſtles and prophets, and before paſtors, and teachers.

The word is derived from the Greek *ευαγγελος*, which is derived from *ευ*, well, and *αγγελος*, an angel, or meſſenger.

EVANID, a name given by ſome authors to ſuch colours as are of no long duration, as thoſe in the rainbow, in clouds before and after ſunſet, &c.

Evanid colours are alſo called ſantaſtical and emphatical colours.

EVANTES, in antiquity, the prieſteſſes of Bacchus; thus called, by reaſon that in celebrating the orgia, they ran about as if diſtracted, crying, *evan, evan, obé evan.*

EVAPORATION, in philoſophy, is the act by which the moiſture in any body is exhaled or evaporated, either by the heat of the ſun, or by means of fire.

The word is Latin, *evaporatio*, and derived from *e*, out of, and *vapor*, a vapour.

Evaporation, in chemiſtry, is that operation whereby the more aqueous and volatile parts of fluids are evaporated or drove away in vapours, in order to render the remaining part of a higher conſiſtence than before.

EVASION, among lawyers, denotes a cunning or ſubtle endeavouring to ſet aſide, or eſcape the puniſhment of, the law.

EVATES, a branch or diviſion of the druids, or ancient Celtic philoſophers. Strabo divides the Britiſh and Gauliſh philoſophers into three ſects, bards, evates, and druids; but Marcellus and Hornius reduce them all to two ſects, viz. the bards and druids. See the articles Bards and Druids.

EUBAGES, an order of prieſts, or philoſophers, among the ancient Celtæ, or Gauls: ſome will have the eubages to be the ſame with the druids, and ſaronidæ of Diodorus; and others, that they were the ſame with what Strabo calls evates.

EUCHARIST, the ſacrament of the Lord's ſupper.

The word is Greek *ευχαριϛια*, derived from *ευ*, well, and *χαρις*, favour or thanks.

In the beginning of Chriſtianity the whole church met together at the Lord's table, generally at their public aſſemblies, on Sundays always, beſides other days, eſpecially Saturday; on which day all the churches in the world, except Rome and Alexandria, uſed to celebrate their ſacrament. At firſt they adminiſtered the euchariſt every day; afterwards four times a week: but as the power of religion declined, it fell to thrice a year, as Chriſtmas, Eaſter, and Whitſuntide.

EUDISTS, a congregation of miſſionary prieſts, in France, aſſociated under the name and title of Jeſus and Mary.

EUDOXIANS, in church hiſtory, a branch of Arians. See Arians.

EVE, the ſame with vigil. See Vigil.

EVECTION *of the Moon*, the ſame with libration. See the article Libration.

EVERARD's *Sliding-Rule*. See Sliding-Rule.

EVERGREENS, in gardening, a term given to thoſe plants which continue their verdure or ſoliage all the year; ſuch are pines, firs, cedars, hollie, bays, phillyreas, laurels, with many others.

EVERLASTING Flower, in botany. See the article Xeranthemum.

Everlasting Pea, in botany, a ſpecies of Lathyrus, which ſee.

EVESDROPPERS, in law, perſons who ſtand under the eves, walls, or windows of a houſe by day or by night, to liſten after news, and carry it to others, thereby raiſing ſtrife and contention in the neighbourhood. They are puniſhable in the court-leet, or quarter-ſeſſions.

EUGENIA, in botany, a genus of plants, whoſe flower conſiſts of four oblong, obtuſe, concave petals, with a number of ſtamina inſerted in the cup. The fruit is a coronated quadrangular drupe, with one cell, containing a ſmooth roundiſh nut.

EVICTION, in law, ſignifies a recovery of lands, or tenements by law.

EVIDENCE. See Certitude.

Evidence, in law, is the teſtimony a perſon gives in court upon any fact of which he has a perſonal knowledge.

EVIL, *Malum*, in philoſophy, &c. is either moral or natural.

Moral evil is the diſagreement between the actions of a moral agent and the rule of thoſe actions, whatever it be.

Moral good and evil coincide with right and wrong, ſince that cannot be good which is wrong, nor that evil which is right.

Natural Evil, whatever deſtroys, or any way diſturbs the perfection of natural beings: ſuch as blindneſs, diſeaſes, death, &c.

Kings Evil, in medicine, the ſame with the ſcrophula. See the article Scrophula.

EUMENIDES, furies, in antiquity. See the article Furies.

EUNOMIANS, in church hiſtory, Chriſtian heretics in the fourth century. They were a branch of Arians, and took their name from Eunomius, biſhop of Cyzicus, who was inſtructed by Ætius in the points which were then controverted in the church, after having at firſt followed the profeſſion of arms. Eunomius ſo well anſwered the deſigns of his maſter, and declaimed ſo vehemently againſt the divinity of the Word, that the people had recourſe to the authority of the prince, and had him baniſhed; but the Arians obtained his recal, and elected him biſhop of Cyzicus. The manners and doctrines of the Eunomians were the ſame with thoſe of the Arians.

EUNUCHS, in church hiſtory, a ſect of heretics in the third century, who were mad enough to caſtrate, not only thoſe of their own perſuaſion, but even all others that they could lay hold of: they took their riſe from the example of Origen, who, miſunderſtanding the following words of our Saviour, — "And eunuchs who made themſelves eunuchs for the kingdom of heaven," caſtrated himſelf.

EVOLUTE, Evoluta, in the higher geometry, a curve, firſt propoſed by Mr. Huygens, and ſince much ſtudied by the later mathematicians.

The evolute is a curve, ſuppoſed to be evolved or opened, and which, in opening deſcribes other curves.

If a thread FCM (plate LIII. *fig.* 9.) be wrapped or wound about the curve BCF, and then unwound again, the point M will deſcribe the curve AMM, which Mr. Huygens, the inventor, calls a curve deſcribed from evolution; and the curve BCF is the evolute, the part MC of the thread being called the radius of the evolute. 1. When the point B falls in A, the radius MC of the evolute is equal to the arch BC; but, if not, to AB + the arch BC. 2. The radius of the evolute CM is perpendicular to the curve AM. 3. Becauſe the radius MC of the evolute continually touches it, it it evident, from the generation of the curve deſcribed from the evolution, that it may be deſcribed through innumerable points, if the tangents in the parts of the evolute are produced until they become equal to their correſponding arches. 4. The evolute of the common parabola is a parabola of the ſecond kind, whoſe parameter is $\frac{27}{16}$ of the common parabola. 5. The evolute of a cycloid is another cycloid equal and ſimilar thereto. 6. All the arches of evolute curves are rectifiable, if the radii of the evolute can be expreſſed geometrically.

EVOLUTION, in arithmetic and algebra, implies the extraction of the roots or powers. See Extraction.

The word is Latin, *evolutio*, formed of the prepoſition *e*, out; and *volvo*, I roll, or wind: q. d. an unwinding, or unrolling.

Evolution, in the art of war, the motion made by a body of troops, when they are obliged to change their form and diſpoſition, in order to preſerve a poſt, occupy another, to attack an enemy with more advantage, or to be in a condition of defending themſelves the better.

Naval Evolutions, the divers movements performed by fleets or ſquadrons at ſea, in ranging or forming into ſuch lines or poſitions as may be thought moſt proper or expedient, either by engaging, defending, or retreating, to the greateſt advantage. This term ſeems to have been firſt applied to the manœuvres of fleets by P. L'Hoſte.

The different expeditions an admiral may be ordered upon, as well as the various circumſtances that occur in conducting a fleet, firſt gave riſe to the ſeveral lines or orders of which it is formed, whoſe motions form what is called evolutions. See the articles Line, Division, and Squadron.

Thoſe who have any knowledge of the marine will undoubtedly allow, that the art of naval evolution is abſolutely neceſſary; ſince this art conſiſts only in the manner of regulating the ſeveral movements of a naval armament. Without this art it reſembles that of the moſt barbarous nations who have not the leaſt knowledge of war, who act without any other rule or order than what their wild ungoverned imaginations ſuggeſt to them, or chance throws in their way. Without a proper knowledge of the art of evolutions, an admiral will diſpoſe of his fleet very imperfectly, whether in oppoſing the enemy, cutting them off, doubling upon, avoiding or chacing them to the greateſt advantage; for all theſe things require that an admiral ſhould move each part of his fleet, as the mind moves the different members of the human body.

EVOLVULUS, in botany, a genus of plants whoſe corolla is monopetalous, with five capillary ſtamina. The fruit is a ſubgloboſe capſule, having four cells, each containing a roundiſh ſeed.

EUONYMUS, the ſpindle-tree, in botany, a genus of plants whoſe flower conſiſts of a monophyllous cup, with four or five ovated plane and patent petals; the ſtamina are five ſubulated erect filaments topped with twin antheræ. The fruit is a ſucculent, four or five cornered, coloured capſule, with the ſame number of cells and angles, each containing one oval ſeed.

A ſpecies of this genus grows naturally in England, in hedges and woods; it hath a ſtrong woody ſtem, dividing into many branches which are furniſhed with ſpear-ſhaped leaves about three inches long, of a deep green colour, and placed oppoſite: it flowers the latter end of May and the beginning of June, and the fruit ripens in October.

The wood of this tree is uſed by the muſical inſtrument makers for toothing of organs and virginal keys; the branches are cut for making ſkewers, and ſpindles are made of the wood, from whence came the Engliſh name, Spindle-tree; but in ſome counties it is called dog-wood: the other ſpecies are natives of foreign countries.

EUPATORIUM, hemp-agrimony, in botany, a genus of plants whoſe flowers are compound, uniform, and tubuloſe; the corollulæ are funnel-ſhaped and hermaphrodite, each having five ſhort hairy filaments topped with cylindrical antheræ: on the calyx (which is oblong and imbricated) are placed the ſeeds, which are oblong, and crowned with a long hairy down.

The common eupatorium, which grows naturally in moſt parts of England, is of a purpliſh green colour, and full of white pith; the leaves grow thick upon the ſtalks and are like thoſe of hemp, they have a very bitter taſte, with a great degree of pungency, and are ſaid to be hepatic, aperient, and vulnerary; alſo good againſt agues and obſtructions of the viſcera.

EUPHEMISM, ευφημισμος, in rhetoric, a figure which expreſſes things in themſelves diſagreeable and ſhocking, in terms implying the contrary quality.

EUPHONY, ευφωνια, in grammar, an eaſineſs, ſmoothneſs, and elegance in pronunciation.

Euphony is properly a figure, whereby we ſuppreſs a letter that is too harſh, and convert it into a ſmoother, contrary to the ordinary rules: of this there are abundance of examples in all languages.

EUPHORBIA, or EUPHORBIUM, in botany, a genus of plants whoſe flower conſiſts of four or five petals, which are thick, gibbous, turbinated, and truncated; the fruit is a roundiſh trilocular capſule, containing three roundiſh ſeeds.

There are many different ſpecies of the euphorbium, ſeveral of which are natives of Africa, and preſerved in Europe in the hot-houſes of the curious. Whether the officinal gummy reſin of that name is extracted from one particular ſpecies, or from ſeveral promiſcuouſly, is uncertain. It is commonly ſuppoſed to be the produce chiefly of that called by Breynius *Euphorbium cerei effigie, &c.* euphorbium reſembling the cereus or torch-thiſtle, with thicker ſtalks armed with long ſpines. What Ray calls the true euphorbium of the ancients is the ſpecies deſcribed in the *Hortus Malabaricus*, there named Schadidacalli, and by Breynius *Euphorbium Indicum, &c.* that is, Indian euphorbium, reſembling the opuntia or prickly pear, with a triangular jointed ſtalk.

The juice is extracted by wounding the ſtem in different parts, pieces of ſheep-ſkin being previouſly tied round near the bottom, to prevent its running down upon the ground: the inciſions are made with a long handled inſtrument, that the operator may receive no injury from the cauſtic liquor ſpurting upon the face, &c. The juice concretes into roundiſh, ſemi-tranſparent whitiſh tears, which for the moſt part are internally hollow: theſe are the euphorbium brought to us. We commonly find bits of the ſtalk, prickles, and ſeeds of the plant intermixed, and not unfrequently ſmall ſtones and ſand. The whitiſh or pale-yellowiſh tears are preferred, as being the freſheſt; the browner or darker coloured they appear, the longer they have been kept.

Euphorbium is in taſte extremely acrimonious: the ſlighteſt touch burns and corrodes the tongue: a ſmall quantity received into the noſe, occaſions violent ſneezing: the utmoſt caution is requiſite in pulverizing it, to guard the eyes, noſe, and mouth from the pernicious effects of the fine duſt that flies off.

The acrimony of euphorbium ſeems to reſide in the more ſubtile parts of the reſin, which are extracted wholly by ſpirit of wine, and almoſt wholly by water, the reſin and gum being nearly in equal proportions. The extreme acrimony of this drug renders it abſolutely unfit for any internal uſe: ſeveral correctors have, indeed, been propoſed for abating its virulence, but the beſt of them are not to be truſted to. It is employed only, and that but ſeldom, for external purpoſes; in ſtimulating unguents and plaſters for paralytic limbs, carious bones, and beginning ſchirrous tumours. Some have ventured on a minute portion of it, mixed with other powders, as an errhine, in obſtructions of the noſtrils, and mucous diſorders of the head; a practice by no means adviſeable, as we are in no want of medicines for theſe purpoſes, equally effectual, and far more ſafe.

EUPHRASIA, eye-bright, in botany, a genus of plants, the corolla of which conſiſts of a ſingle ringent petal; the tube is of the length of the cup; the upper lip is concave and emarginated; the lower one is patent, and divided into three ſegments: the fruit is an ovato-oblong, compreſſed capſule, forming two cells: the ſeeds are numerous, very ſmall, and of a roundiſh figure.

This plant is celebrated for curing diſorders of the eyes; the leaves powdered and ſnuffed up the noſe, is ſaid to diſſolve thoſe thick groſs humours which ſometime happen in the brain.

EURYTHMY, in architecture, ſculpture, painting, &c. is a kind of majeſtic appearance, an inexpreſſible elegance and eaſineſs in the compoſition of all the members of a body, building, or picture, that reſults from their fine proportion and correſpondence with each other.

The word is Greek, ευ, eaſily, and ρυθμος, number, order.

EUSEBIANS, a name given to Arians. See the article ARIANS.

EUSTATHIANS, the ſame with the catholics of Antioch, in the fourth century, ſo called from their refuſing to acknowledge any other biſhop beſide St. Euſtathius, who was depoſed by the Arians.

EUSTYLE, in architecture, is a ſort of building in which the pillars are placed at the moſt convenient diſtance one from another, the intercolumniations being all juſt two diameters and a quarter of the column, except thoſe in the middle of the face, before and behind, which are three diameters diſtant.

The word is Greek, ευϛυλος, and derived from ευ, proper, and ϛυλος, a column.

EUTYCHIANS, in church hiſtory, heretics in the fifth century, who embraced the errors of the monk Eutyches, maintaining that there was only one nature in Chriſt. The divine nature, according to them, had ſo entirely ſwallowed up the human, that the latter could not be diſtinguiſhed; inſomuch that Jeſus was merely God, and had nothing of humanity but the appearance. This hereſy was condemned in a council held at Conſtantinople in 448, which ſentence was confirmed by a general council of Chalcedon, in 451.

EWE, the Engliſh name of a female ſheep. See the article SHEEP.

EWRY, in the Britiſh cuſtoms, an office in the king's houſhold, which has the care of the table linen, of laying the cloth, and ſerving up water, in ſilver ewers, after dinner.

EXACERBATION, the ſame with paroxyſm. See the article PAROXYSM.

EXACTION, in law, a wrong done by an officer, or a perſon in pretended authority, in taking a reward or fee that is not allowed by law.

EXÆRESIS, in ſurgery, is the removing any thing hurtful or ſuperfluous out of the body.

The word is Greek, from εξ, out of, and αιρεω, to take.

EXAGGERATION, in rhetoric, is a kind of hyperbole, whereby things are augmented or amplified, by ſaying more than the truth, either as to good or bad.

The word is Latin, *exaggeratio*, and derived from *ex* and *agger*, a bank.

EXALTATION, in aſtrology, is a dignity which a planet acquires in certain ſigns or parts of the zodiac, which dignity is ſuppoſed to give it an extraordinary efficacy and influence. Thus the 15° of Cancer is the exaltation of Jupiter, according to Abulmazar; that of the ſun is the 19° of Aries, and that of the moon is in Taurus.

EXAMINATION, in ſea affairs, a ſort of naval catechiſm, compoſed of various queſtions put by a committee of veteran ſea-captains to the midſhipmen, to diſcover whether they are ſufficiently qualified in the knowledge of their profeſſion to become a lieutenant.

EXAMINERS, in chancery, two officers of that court, who examine, upon oath, witneſſes produced in cauſes depending there, by either the complainant or defendant, where the witneſſes live in London, or near it. Sometimes parties themſelves, by particular order, are examined.

EXANTHEMA, in medicine, is a poſtule or eruption on the ſkin, as the meaſles, ſmall-pox, &c. and is generally attended with a fever, and terminates in a raſh.

The word is Greek, εξανθημα, which is derived from εξ, out of, and ανθεω, to flower.

EXARCH, εξαρχος, in antiquity, an officer ſent by the emperors of the Eaſt, into Italy, in quality of vicar, or rather præfect, to defend that part of Italy which ſtill continued under their obedience, and particularly the city of Ravenna, againſt the Lombards.

EXCELLENCY, a title anciently given to kings and emperors, but now to ambaſſadors, and other perſons, who are not qualified for that of Highneſs, and yet are to be elevated above the other inferior dignities.

EXCENTRIC, or ECCENTRIC, in geometry, are circles that have not the ſame center. The word is Latin, *excentricus*, and is derived from *ex*, out of, and *centrum*, a center.

The excentric circle in the Ptolemaic ſyſtem is alſo called deferent, becauſe it ſeems to carry the the planet round in its circumference. The orbit of the ſun is excentric with regard to the terreſtrial globe; that is, it does not revolve round the ſame center.

EXCENTRIC, in the new aſtronomy; inſtead of the excentric circles in the Ptolemaic ſyſtem, the moderns have ſuppoſed oval or elliptic ones, in order to explain the apparent irregularity of the planets, and their different diſtances with regard to the earth.

EXCENTRIC *Equation*, in the old aſtronomy, is an angle made by a line drawn from the center of the earth, and another drawn from the center of the excentric to the body or place of any planet; it is the ſame with the proſtaphæreſis, and is equal to the difference, accounted in an arch of the ecliptic, between the ſun's or planet's real and apparent place.

ECCENTRIC *Place of a Planet*, is the true point of the orbit upon which the circle of inclination coming from the place of a planet in its orbit, falls thereon at right-angles. Mars is very eccentric with regard to the ſun.

Anomaly of the ECCENTRIC. See the article ANOMALY.

EXCENTRICITY, or ECCENTRICITY, in the Ptolemaic aſtronomy, is that part of the linea apſidum lying between the center of the earth and of the excentric; or it is that circle which the ſun is ſuppoſed to move in about our earth, and which has not the earth exactly for its center. And this the ancients found muſt be ſuppoſed, becauſe the ſun ſometimes appeared large, and then it is neareſt to us; and ſometimes ſmaller, and then it is farther off.

EXCENTRICITY *of the Earth*, in the new aſtronomy, is the diſtance between the focus and the center of the earth's elliptic orbit.

Mr. Whiſton, in his *Prælect. Aſtron.* page 90, ſhews the method of finding this from the apparent motion of the ſun, compared with the two extremes of the apſides: for ſince the true velocity of the earth in her aphelion and perehelion is in a reciprocal ratio of her diſtances from the ſun; and that the apparent and angular velocity is in a duplicate ratio of her diſtances reciprocally; from the apparent difference of theſe two velocities, the difference of the diſtances, or the double exentricity, will eaſily be known. The excentricity of the whole diſtance is, at a mean, about a ſixtieth part, or more accurately .01786.

EXCEPTION, in law, denotes a ſtop or ſtay to an action, and is either dilatory or peremptory, in proceedings at common law; but in chancery it is what the plaintiff alleges againſt the ſufficiency of an anſwer, &c.

Exception *to Evidence*, is where a demurrer is offered in any civil cauſe, for the inſufficiency of the evidence given, and the court does not agree to it; in ſuch caſe, the court, upon requeſt, is to ſeal a bill of exceptions to the evidence, which may be heard on a writ of error.

Exceptions *in Deeds and Writings*, is the ſaving a particular thing out of a general one granted by deed; as a room, ſhop, or cellar, out of a houſe; a field, or timber trees, out of land, &c.

EXCERPTA, in matters of literature. See Extract.

EXCESS, in arithmetic and geometry, is the difference between any two unequal numbers or quantities, or that which is left after the leſſer is taken from or out of the greater. See Subtraction.

EXCHANGE, in a general ſenſe, implies a contract or agreement whereby one thing is given or exchanged for another.

Exchange, in commerce, is the trade of money carried on between one place and another, by means of bills of exchange.

The things neceſſary to be conſidered in exchange are; 1. The real monies of each country or trading town. 2. Their imaginary monies. 3. The par of exchange.

1. By real money is meant a certain quantity of metal coined by the authority of a ſtate, and current at a certain value, by virtue of that authority.

2. By imaginary money we are to underſtand all denominations uſed to expreſs ſuch ſums as have no real ſpecies, or coin, of the value of theſe denominations.

1. The real monies of England.

Gold coins.	£.	s.	d.
A guinea, valued at	1	1	0
A half guinea	0	10	6
A quarter guinea	0	5	3
Silver coins.			
A crown, valued at	0	5	0
A half crown	0	2	6
A ſhilling	0	1	0
A ſixpence	0	0	6

Copper coins.

The half-penny, and the farthing, four of which make a penny.

Imaginary monies.

The pound, equal to twenty ſhillings.
The mark, equal to thirteen ſhillings and four pence.
The angel, equal to ten ſhillings.
The noble, equal to ſix ſhillings and eight pence.
The penny, equal to four farthing.

2. The real monies of Holland.

Gold coins.	Florins
A ducat, or ducatoon, valued at	20
A ſovereign	15
A roſe noble	11
Silver and copper coins.	Stivers
A ducatoon, valued at	63
A dric gulden	60
A rix-dollar	50
A crown	40
A dollar	30
A guld florin	28
A ſchilling or ſhilling	06
A ſtiver	01

Imaginary monies.

The guilder, or florin, of twenty ſtivers, or 240 groots.

The pound Flemiſh, of twenty ſhillings, or ſix guilders.

The groot, or penny Flemiſh, of half a ſtiver, or eight pfennicks.

The pfennick, or pfenning, or denier, $\frac{1}{16}$ of a ſtiver.

At Amſterdam, Rotterdam, Middleburg, &c. they keep their accounts either in guilders, ſtivers, and pfennicks; or pounds, ſhillings, and pence Flemiſh; which are divided as ours, viz. their pound into twenty ſhillings, and their ſhillings into twelve pence.

They exchange with London upon the pound ſterling, giving for it, when at par, 10 guilders, or, which is the ſame thing, thirty-three ſhillings and four pence Flemiſh.

The courſe of exchange runs between thirty and thirty-eight ſhillings Flemiſh per pound ſterling.

In Hamburgh and Antwerp, they keep their accounts and exchange with London, in the ſame manner as with Holland.

London exchanges alſo with Denmark, Norway, Sweden, Muſcovy, Germany, Switzerland, Savoy, &c. but it is commonly done by the way of Hamburgh, Amſterdam, or Antwerp.

3. The real monies of France.

Gold coins.	Livres
Double louis d'or	22
Louis d'or	11
Half louis d'or	05$\frac{1}{2}$
Silver coins.	
Ecu or crown	3
Half ecu	1$\frac{1}{2}$

They have alſo a $\frac{1}{5}$ ecu and $\frac{1}{10}$ ecu

Braſs coin.

The only braſs coin is the ſol, twenty of which make a livre.

Copper coins.

The liard or farthing, four of which make a ſol.

The denier, twelve of which make a ſol.

The double, which was coined for a double denier, but paſſes now for a liard.

Imaginary monies.

The piſtole, equal to ten livres.

The livre, equal to twenty ſols, or $\frac{1}{3}$ of an ecu.

At Paris, Lyons, Rouen, &c. they keep their accounts in livres, ſols, and deniers: and exchange upon the ecu, or crown; the par of which, in ſterling money, is four ſhillings and ſixpence.

But it is to be obſerved, that the kings of France often raiſe the ſpecies of the kingdom to rates conſiderably higher than thoſe for which they were at firſt coined, and conſequently far above their intrinſic value: ſo that a crown in ſpecie will paſs at four, five, or ſix livres. And three ſuch livres are ſtill named an ecu, or crown, though of a far leſs value than the ecu blanc, or white crown, that is, a crown in ſpecie. Hence it happens that the exchange is very variable, and falls low in proportion to the riſing of the French money above the intrinſic worth of the ſpecies.

The courſe runs between twenty-five and forty pence ſterling per crown, or between twenty and thirty livres per pound ſterling.

N. B. The French add the term tournois to their money, to diſtinguiſh it from the money of other nations, in the ſame manner as the Engliſh add the word ſterling to theirs.

The money of Spain is of two ſorts, viz. of plate and of bullion; the plate-money is of good ſilver, never changes its price, and is reckoned more than twenty per cent better than the money of bullion, which is a mixture of ſilver and braſs, and as often varying in its price. In many places they buy and ſell in rials of bullion, but when they ſtate the accounts in their books, they commonly reduce them, by an allowance of ſo much per cent. to rials of plate.

4. The real and imaginary monies of Spain.

Gold coins.	Mervadies
A piſtole, valued at four peſos, or pieces of eight, or at — —	1088
An half piſtole, at two peſos, or —	544
Silver coins.	
A peſo, or piece of eight, $\frac{8}{8}$ at — —	272
A rial, at — — —	34

A mervadie is a ſmall piece of braſs or copper, five of which and about $\frac{1}{2}$, are, in value, equal to an Engliſh penny.

The imaginary ducat, in exchange, is valued at 375 mervadies, but in buying and ſelling it is only accounted 374.

In Madrid, Seville, &c. they keep their accounts in rials and mervadies, and exchange upon the piece of eight, the par of which, with London, is four ſhillings and ſixpence; but the courſe of exchange runs between fifty-two pence and ſeventy-two pence ſterling.

5. The real monies of Portugal.	Rees.
Broad ducat of gold, valued at —	1000
Double piſtole — — —	4000
Piſtole — — —	2000
Half-piſtole, or mil-ree — —	1000
Stamped patacoon — —	600
Current patacoon — —	500
Stamped cruſade — — —	500
Current cruſade — — —	400
Stamped piſo — — —	480
Teſton — — —	100

There are alſo the fractions of a teſton, at 80, 60, 40, 20, and 10 rees, which are of a mixed metal, compoſed of ſilver and braſs.

There are ſeveral other ſpecies in Portugal; ſuch as the moidore, a gold coin, valued at twenty-ſeven ſhillings ſterling; the John, or Joannes, which is alſo gold, worth thirty-ſix ſhillings; the half Joannes and quarter Joannes; as alſo the double Joannes, valued at three pound twelve ſterling, &c.

In Liſbon, Oporto, &c. they keep their accounts in rees, and exchange in the half piſtole, or mil-ree; the par of which is about ſix ſhillings and eight-pence half-penny ſterling; but the courſe of exchange runs commonly betwixt fifty and eighty-pence ſterling per mil-ree.

6. The ſpecies or coins of Italy are very numerous, and would require more room than can be ſpared in this place: paſſing, therefore, the real monies, we ſhall only ſhew the manner of exchange between London and Genoa, Leghorn, Milan, Venice, and Rome.

At Genoa, they keep their accounts in lires, ſoldi, and deniers; reckoning twelve deniers to a ſoldi, and twenty ſoldi to a lire; and exchange upon the peyzo, of five lires, whoſe par is about four ſhillings and ſix-pence ſterling: and the courſe of exchange is from forty-ſix to ſeventy-ſix and ſeventy-eight pence per peyzo.

At Milan they keep their accounts in the ſame manner, but exchange upon the ducat, of five lires fifteen ſoldi. The courſe of exchange runs from fifty-five to ſixty-ſeven pence ſterling per ducat.

At Venice, merchants keep their accounts in lires, ſoldi, and pichioli; reckoning twelve pichioli to the ſoldi, and twenty ſoldi to the lire. But the bank reckons by ducats and groſſes. The ducat conſiſts of twenty-four groſſes. They exchange upon the ducat; the par of which is four ſhillings and eight-pence halfpenny ſterling, and the courſe is from fifty-two to ſixty-nine pence ſterling per ducat bancho.

Rome exchanges with London upon the ſcudi, whoſe par is about five ſhillings and ſixpence ſterling per ſcudi.

7. In the plantations of America, they reckon their monies, and keep their accounts, the ſame way as they do in Britain. But their money is of far leſs value; for bills upon London from any of the Caribbee-Iſlands are uſually charged with 25 per cent. in favour of London; that is, if St. Chriſtopher's, Montſerrat, Antigua, &c. ſhould draw upon London 100 *l.* the merchants of London charge the drawer with 125 *l.* for the ſaid 100; and for Jamaica, Virginia, Maryland, Penſilvania, New-England, &c. the difference is commonly greater.

London exchanges alſo with Ireland; but the courſe of exchange varies according to the demand of money or bills; it is commonly between four and fifteen per cent. loſs to Ireland, or in favour of London.

The end and deſign of exchange is to avoid the riſk, and ſave the expence, of transferring money.

The conſequence is, that bills of exchange repreſent money ſo effectually, that there is no difference between the one and the other. An example will ſet theſe propoſitions in a clearer light.

Let us ſuppoſe Peter of London debtor to Paul of Paris for goods received, and, at the ſame time, that Anthony of Paris has bought of James of London goods of an equal value: if the two creditors (Paul of Paris and James of London) exchange their debtors, a transfer of money is needleſs. Let Peter of London pay to James of London the ſum he owes to Paul of Paris, and let James for the ſaid ſum transfer to him, by an order in writing, that which he has at Paris in the hands of Anthony. Peter, the proprietor of this order, will transfer it to Paul his creditor at Paris, and Paul, on preſenting it to Anthony, will receive caſh for it.

If no merchant of Paris had owed money in London, Peter would have been under the neceſſity of ſending over money to Paris to pay his debt: or, if James had ſold, at Paris, only to half the value that Peter was indebted there, the half of Peter's debt would have been acquitted, the other half by ſending over the ſpecie.

It is evident, therefore, that exchange ſuppoſes reciprocal debts, that without them it could not exiſt, and that it conſiſts in the exchange of the debtors.

The example propoſed proves alſo, that the object, end, deſign of exchange, is to ſpare the hazard and expence of transferring money. Let us ſuppoſe the debt between the two, 100 *l.* and value the riſk and charges on merchandize in trade at 40 *l.* it is plain each muſt pay 110 *l.* inſtead of 100 *l.* without an exchange of debtors.

The conſequence is alſo completely demonſtrated by this example, for the bill of exchange drawn by James of London, or Anthony of Paris, was ſo effectually the ſign of money, that Paul of Paris, to whom it was ſent, has actually received 100 *l.* on preſenting it.

For underſtanding the par of exchange, it muſt be obſerved, that it has been found convenient, in the fabrication of monies, to mix a certain quantity of baſer metal, called alloy, with the pure gold and ſilver; and the proportion of alloy is different in different kingdoms: and accordingly, the coins are ſaid to be of a different degree of fineneſs; and two coins, though of a different weight, that have an equal quantity of pure gold or ſilver, are ſaid to be at par. And upon a computation it has been found, that the quantity of pure ſilver in an Engliſh crown is as 9 to 10; and therefore the par of the French crown is, in ſterling-money, four ſhillings and ſixpence. In like manner are other coins to be compared, in order to have their par determined.

The cauſes of the alteration of the par of exchange, are the alteration of public credit, and the abundance or ſcarcity of credits of one country upon another.

A variation in the current coin is an example of the variation which the loſs of public credit makes in the par of exchange: although, at the very inſtant this change was made in the current coin, a new real par of exchange commenced, yet, the public credit declining, on account of the uncertainty of the property and the ſpecie not circulating, what repreſents the ſpecie muſt of courſe be under its value.

The ſecond cauſe of the alteration of the par of exchange, is the abundance or ſcarcity of credits of one country upon another; and this abundance or ſcarcity proceed in general from two cauſes.

One is the neceſſity that obliges the body politic of a ſtate to tranſport large ſums into foreign countries, as in caſe of a war.

The other lies in the proportion of the current mutual debts of private perſons in each ſtate.

The private perſons of two nations may contract two kinds of reciprocal debts.

The inequality of reciprocal ſales will form a firſt kind of debts.

If one of the two nations has a great deal of money at lower intereſt than the other, the rich private perſons in the former nation will buy up all the public ſecurities of the other, becauſe they will receive more intereſt for their money: the product of this intereſt, which muſt be paid every year, forms a ſecond ſpecies of debts: this may be looked upon as the product of a commerce, becauſe the national funds are negociated; and, if you obſerve attentively, this is not a matter of ſpeculation only; in this caſe and ſeveral others, money is the merchandiſe, and thus theſe two debts belong properly to what is called the balance of trade, and will occaſion an abundance or ſcarcity of the credits of one country upon another.

When two nations would ſettle the balance of their commerce, that is, pay their reciprocal debts, they have recourſe to the exchange of debtors; but if the reciprocal debts are not equal, the exchange of debtors will only pay a part of theſe debts, the ſurpluſage or balance of trade muſt be paid in ſpecie.

The deſign and intention of exchange is to ſave the expence and hazard of tranſporting money; conſequently, every private perſon, before he determines on this method of trade, will ſeek credits on the country where he ſtands indebted.

Theſe credits will be dear in proportion to the difficulty of acquiring them, and conſequently, to have the preference, we are obliged to pay above their real value; if the credits are eaſy to come at, we ſhall pay under their value.

Let us ſuppoſe the merchants of Paris owe the manufacturers of Rouen 20,000 livres, and that the manufacturers of Rouen owe the bankers of Paris 10,000 livres; to ſatisfy theſe demands, we muſt make a bill of exchange for the 10,000 livers, the reciprocal debts between Paris and Rouen, and ſend the other 10,000 livers from Paris to Rouen.

Let us rate the charge and hazard of ſending this ſum at five livers per m. Every merchant in Paris will try to ſave this expence, and will ſeek to purchaſe a credit of 1000 livers on Rouen; but as theſe credits are ſcarce, and difficult to procure, he will gladly give 1004 livers for a draught of 1000 livers on Rouen, and ſave one liver per m. Thus the ſcarcity of bills of exchange on Rouen will lower the price of this exchange four livers per *m.* under par.

Exchange alſo ſignifies a place in moſt conſiderable trading cities, wherein the merchants, negociants, agents, bankers, brokers, interpreters, and other perſons concerned in commerce, meet on certain days, and at certain times, in order to confer and treat together of matters relating to exchanges, aſſurances, freightments, and other mercantile negociations both by ſea and land.

Theſe aſſemblies are held with ſo much exactneſs, that the abſence of a merchant, &c. makes him ſuſpected of drawing to a failure or bankruptcy, as not being able to ſtand the change.

EXCHANGERS are ſuch as return money by bills of exchanger.

EXCHEQUER, in the Britiſh juriſprudence, an ancient court of record, in which all cauſes concerning the revenues and rights of the crown are heard and determined, and where the crown revenues are received.

It took this name from the cloth that covered the table of the court, which was party-coloured, or chequered.

Black Book of the Exchequer, a book containing a deſcription of the court of England in 1175, and its officers, with their ranks, wages, privileges, perquiſites, &c. alſo the revenues of the crown, both in money and cattle.

EXCISE, a certain duty or impoſt, charged upon liquors, as beer, ale, cyder, perry, malt, &c. and ſeveral other commodities, within the kingdom of Great-Britain, and town of Berwick upon Tweed.

The exciſe is one of the moſt conſiderable branches of the king's revenues. It was formerly farmed out, but is now managed for the king by commiſſioners in both kingdoms, who receive the whole product of the exciſe, and pay it into the exchequer. Theſe commiſſioners are nine in number in England, and four in Scotland. The former have a ſalary of 1000 *l.* a year, the latter 500 *l.* They are obliged by oath to take no fee or reward, but from the king himſelf; and from them there lies an appeal to five other commiſſioners, called commiſſioners of appeals.

EXCLAMATION, in rhetoric, is an elevation of the voice which expreſſes the vehemence of any paſſion, as ſurprize, joy, admiration, indignation, grief, fear, deſire, &c. In Engliſh the interjections O! oh! alas! &c. are generally uſed in exclamation, in Latin oh! heu! ah! vah! &c.

The word is Latin, and derived from *exclamo*, to cry out.

EXCOMMUNICATION, an eccleſiaſtical penalty or cenſure, whereby ſuch perſons as are guilty of any notorious crime or offence are ſeparated from the communion of the church, and deprived of all ſpiritual advantages.

EXCOMMUNICATO Capiendo, a writ iſſued from the chancery upon the biſhop's certifying an excommunication.

EXCORIATION, in medicine and ſurgery, the galling or rubbing off of the cuticle, eſpecially of the parts between the thighs and about the anus.

EXCORTICATION, the ſame with barking of trees. See the article Barking.

EXCREMENT, whatever is diſcharged out of the body of animals, after digeſtion, or whatever is otherwiſe ſuperfluous or noxious in them. Urine and the fæces are the groſs excrements that are diſcharged out of the bladder or belly. Phyſicians likewiſe call excrement the various humours that are ſecreted from the blood through the various ſtrainers in the body, and which ſerve for ſeveral uſes, ſuch as the ſaliva, ſweat, bile, the pancreatic juice, lymph, the ſemen, nails, the hair, the horns and hoofs of animals.

The word is Latin, *excrementum*, which is derived from *excreo*, to ſpit or ſpawl.

EXCRESCENCE, in ſurgery, is any ſuperfluous matter that grows preternaturally upon the human or any other body; as wens, warts, or any ſort of ſwelling, particularly a fleſhy tumour.

The word is Latin, *excreſcentia*, which is derived from *excreſco*, to ſhoot or grow out.

EXCRETION, in medicine, is the act of ſeparating excrements, or excrementitious humours, from the aliments or blood.

The word is Latin, *excretio*, which is derived from *ex*, out of, and *creo*, to chooſe.

EXCRETORY, in anatomy, is a term applied to certain little ducts or veſſels which make part of the ſtructure of the glands, being the ſmall tubes through which the humours, ſeparated into the glands, are diſcharged out of them into ſome convenient receptacle or emunctory.

EXCURSION, in aſtronomy, is uſed in a ſynonimous ſenſe with elongation. See the article ELONGATION.

EXECRATION, *execratio*, in antiquity, a kind of puniſhment, conſiſting of direful curſes and marks of infamy.

EXECUTION, in a general ſenſe, the act of accompliſhing, finiſhing, or atchieving any thing that is to be done.

EXECUTION, in law, the completing or finiſhing ſome act, as of judgment, deed, &c. and it uſually ſignifies the obtaining poſſeſſion of any thing recovered by judgment of law.

Military EXECUTION, the pillaging or plundering of a country by the enemy's army.

EXECUTOR, in law, a perſon appointed by another's laſt will and teſtament to have the execution of the ſame after his deceaſe, and the diſpoſing of the teſtator's goods and effects according to the intent of the will.

The law accounts an executor one perſon with the party whoſe executor he is; having all the advantages of action, and being ſubject to the ſame actions as the deceaſed.

Hence, as an executor derives his power wholly from the will, he may releaſe a debt, or do any thing as executor, before probate of the will, provided he afterwards proves it: however, to maintain actions for debts, he muſt ſhew the teſtament proved. He may immediately take the goods, or give power to another to ſeize them for him.

A perſon capable of making an executor, either makes one, two, three, or more; and he may appoint that one ſhall be his executor for one year, and another for another. If he appoints executors only for a certain number of years, after they are elapſed, the ordinary may grant adminiſtration of the goods; as he may do, till the power of the executors take place. It is alſo obſervable, that where there is no executor, there is properly no will: and where there is no will there can be no executors; but this only regards goods; for where lands in fee are deviſed, it is a good will, though no executor be named therein.

An executor may either accept or refuſe the executorſhip; but after he has accepted the office, he ſhall not refuſe the ſame, nor take it up after refuſal. If any one of the ſeveral executors prove the will, it will ſerve for all; ſo that the reſt may at any time after join with him and intermeddle with the eſtate. When any action is brought, it muſt be in the name of all the executors, notwithſtanding ſome of them may not act; but in any action commenced againſt them, he only that adminiſters is to be ſued. The poſſeſſion of one executor is held to be poſſeſſion of them all; and moſt acts done by or to one, are deemed done by or to all of them.

EXECUTORY, in law, is where an eſtate in fee, that is made by deed or fine, is to be executed afterwards by entry, livery, or writ. Leaſes for years, annuities, conditions, &c. are termed inheritances executory.

EXECUTORY DEVISE, is when the fee by deviſe is veſted in any perſon, and is to be veſted in another upon contingency. In all caſes of executory deviſes, the eſtates deſcend until the contingencies happen.

EXEDRA, in church hiſtory, a name ſometimes given to the ambo. See AMBO.

EXEDRÆ, in antiquity, a general name for ſuch buildings as were diſtinct from the main body of the churches, and yet within the limits of the church taken in its largeſt ſenſe.

EXEMPLIFICATION OF LETTERS PATENT, a tranſcript or duplicate of them, made from the inrollment thereof, and ſealed with the great ſeal.

EXEMPTION, in law, a privilege to be free from ſome ſervice or appearance.

EXERCISE, is ſuch an agitation of the body as produces ſalutary effects in the animal œconomy.

Exerciſe, Dr. Cheyne obſerves, is indiſpenſably neceſſary to preſerve the body in due plight; without exerciſe the juices will thicken, the nerves relax, the joints ſtiffen; and, on theſe diſorders, chronical diſeaſes and a crazy old age will enſue. The body may be conſidered as a ſyſtem of tubes and glands admirably adapted throughout, as a proper engine for the ſoul to work with. Exerciſe ferments the humours, caſts them into their proper channel, throws off redundancies, and helps nature in thoſe ſecret diſtributions without which the body cannot ſubſiſt in its vigour, nor the ſoul act with chearfulneſs. Had not exerciſe been abſolutely neceſſary for our well-being, nature would not have given ſuch an activity to the limbs of the body, and ſuch a pliancy to every part, as neceſſarily produce thoſe compreſſions, extenſions, dilatations, and all other kinds of motions neceſſary for the preſervation of ſuch a ſyſtem of tubes and glands. And, that we might not want inducements to ſuch an exerciſe of the body, riches and honour, even food and raiment,

ment, are not to be come at, without the toil of the hands, and ſweat of the brow.

He farther obſerves, that thoſe organs of the body which are moſt uſed, always become the ſtrongeſt. Thus the legs, feet, and thighs of chairmen, the arms and hands of watermen, the backs and ſhoulders of porters, grow thick and ſtrong by uſe. Of all the kinds of exerciſe there is none which conduces ſo much to the health, and is every way accommodated to the body, as that of riding, which is leſs laborious and expenſive of ſpirits than any other. Dr. Sydenham is very laviſh in its praiſes. Dr. Mead too recommends it in the concluſion of his *Monita & Præcepta*.

Exercise, in military affairs, is the ranging a body of ſoldiers in form of battle, and making them perform the ſeveral motions and military evolutions with different management of their arms, in order to make them expert therein.

Exercises are alſo underſtood of what young gentlemen learn in the academies and riding ſchools, ſuch as fencing, dancing, riding the great horſe, &c.

EXERGUM, among antiquarians, a little ſpace around or without the figures of a medal, left for the inſcription, cypher, device, date, &c.

EXFOLIATION, in ſurgery, the ſcaling of a bone, or its ſeparating into laminæ or leaves.

The word is Latin, *exfoliatio*, and derived from *ex*, and *folium*, a leaf.

EX GRAVI Querela, in law, is a writ that lies for the perſon to whom any lands or tenements in fee are deviſed by will, and the heir of the deviſor enters thereon, and detains them from the deviſee.

EXHALATION, in philoſophy, is applied to thoſe dry corpuſcles, as alſo to the pinguious, oleaginous, ſulphureous particles or effluvia, that are ſeparated from hard, earthly, fat bodies, particularly the earth itſelf, either by the heat of the ſun, the agitation of the air, or ſome other cauſes ; and being emitted upwards, to a certain height in the atmoſphere, there mix with the vapours, which properly are thoſe moiſt fumes that are raiſed from water, and other liquid bodies. and help to form clouds, which return back in dew, miſt, rain, ſnow, hail, &c.

The word is Latin, *exhalatio*, which is derived from *exhalo*, to breath, or ſteam out.

The nitrous and ſulphureous exhalations are the chief matter of which thunder, lightning, dew, and other meteors are generated in the air. According to Sir Iſaac Newton, true and permanent air is formed from the exhalations raiſed from the hardeſt and moſt compact bodies.

EXHAUSTED Receiver, a glaſs, or other veſſel, out of which the air hath been drawn by means of the air-pump. See the article Air-Pump.

EXHAUSTIONS, in mathematics, is a method in frequent uſe among the ancient mathematicians, Euclid, Archimedes, &c. that proves the equality of two magnitudes, by a deduction ad abſurdum, in ſuppoſing that, if one be greater or leſs than the other, there would follow an abſurdity : this is founded on what Exclid ſays in his tenth book, namely, "That thoſe qualities whoſe difference is leſs than any aſſignable one, are equal ;" for if they were unequal, be the difference never ſo ſmall, yet it may be ſo multiplied, as to become greater than either of them ; if not ſo, then it is really nothing. This he aſſumes in the proof of the firſt propoſition of book ten, which is, "That if from the greater of two quantities you take more than its half, and from the remainder more than its half, and ſo continually, there will at length remain a quantity leſs than either of thoſe propoſed.

On this foundation they demonſtrate, that if a regular polygon of infinite ſides be inſcribed in, or circumſcribed about a circle, the ſpace that is the difference between the circle and the polygon will, by degrees, be quite exhauſted, and the circle be equal to the polygon.

EXHIBIT, in law, is where a deed, or other writing, being produced in a chancery ſuit, to be proved by witneſſes, the examiner, or commiſſioner appointed after the examination of any ſuch, certifies on the back of the deed, or writing, that the ſame was ſhewn to the witneſs, at the time of his examination, and by him ſworn to.

EXHIBITION, a benefaction ſettled for the benefit of ſcholars in the univerſities, that are not on the foundation.

Exhibition was anciently an allowance for meat and drink, ſuch as the religious appropriators made to the poor depending vicar.

EXHORTATION, in rhetoric, differs only from ſuaſion, as being more directly addreſſed to the paſſions.

EXIGENT, in law, a writ which lies where the defendant in a perſonal action cannot be found, nor any effects of his within the county, by which he may be attached or diſtrained.

EXIGENTERS, four officers in the court of Common-Pleas, who make all exigents and proclamations in all actions where proceſs of outlawry lies.

EXILIUM, in law, ſignifies a ſpoiling ; but ſeems to be reſtrained to the injury done to tenants by altering their tenure, ejecting them, &c.

EXISTENCE, that whereby a thing has an actual eſſence, or is ſaid to exiſt, or be.

The word is Latin, and derived from *exiſto*, to be, or exiſt.

It has been a ſubject of great diſpute, whether eternal bodies have any exiſtence but in the mind ; that is, whether they really exiſt, or exiſt in idea only. The former opinion is ſupported by Mr. Locke, and the latter by Dr. Berkeley.

Thoſe who deſire to ſee the arguments brought by thoſe learned authors, we refer to Locke's Eſſay on Human Underſtanding, and Berkeley's Princip. of Human Knowledge.

EXIT, *Exitus*, in law, properly ſignifies iſſue, or offspring; but is alſo applied to iſſues, annual rents, and profits of lands.

Exit, in a theatrical ſenſe, the action of a player in going off the ſtage, after he has played his part.

EXODIUM, in the ancient Greek drama, one of the four parts or diviſions of tragedy, being ſo much of the piece as included the cataſtrophe and unravelling of the plot, and anſwering nearly to our fourth and fifth acts. See Epilogue.

Exodium, *εξοδιον*, in the Septuagint, ſignifies the end or concluſion of a feaſt.

EXODUS, a canonical book in the Old Teſtament, being the ſecond of the Pentateuch, or five books of Moſes.

It is ſo called from the Greek *εξοδος*, going out, or departure of the children of Iſrael from the land of Egypt; the hiſtory of which is delivered in this book, together with the many miracles wrought on that occaſion.

EX OFFICIO, among lawyers, ſignifies the power a perſon has, by virtue of his office, to do certain acts without being applied to.

EXOMPHALUS, in ſurgery, is a hernia, or kind of rupture, that exhibits a preternatural tumor or protuberance at the navel.

The word is Greek, *εξομφαλος*, and derived from *εξ* and *ομφαλος*, the navel.

This rupture is owing to the protruſion of the inteſtine, or omentum, or both of them, at the navel, and rarely happens to be the ſubject of an operation; for though the caſe is common, yet moſt of them are gradually formed from very ſmall beginnings, and if they do not return into the abdomen upon lying down, in all probability they adhere without any great inconvenience to the patient, until ſome time or other an inflammation falls upon the inteſtines, which ſoon brings on a mortification and death; unleſs, by great chance, the mortified part ſeparates from the ſound one, leaving its extremity to perform the office of an anus: in this emergency, however, I think it adviſeable to attempt the reduction, if called in at the beginning, though the univerſal adheſion of the ſac and its contents are a great obſtacle to the ſucceſs: the inſtance in which it is moſt likely to anſwer, is when the rupture is owing to any ſtrain, or ſudden jerk, and is attended with thoſe diſorders which follow upon the ſtrangulation of a gut.

In this caſe, having tried all other means in vain, the operation is abſolutely neceſſary: which may be thus performed: make the inciſion ſomewhat above the tumour, on the left ſide of the navel, through the membrana adipoſa; and then emptying the ſac of it water, or mortified omentum, dilate the ring with the ſame crooked knife, conducted on your finger; after this, return the inteſtines and omentum into the abdomen, and dreſs the wound without making any ligature, but of the ſkin only. *Sharp's Surgery.*

EXORCISM, a ceremony conſiſting of prayers and conjurations to drive the devil out of perſons poſſeſſed, or for the removal of any danger or diſeaſes from man or beaſt, and to deſtroy vermin and noxious animals.

The word is Greek, *εξορκισμος*, and derived from *εξ*, out of, and *ορκος*, an oath, or religious ceremony.

The uſe of exorciſm is almoſt as ancient as the church: it makes a conſiderable part of the ſuperſtition of the Romiſh church, for which ſhe hath appointed many ridiculous ceremonies in her rituals. The Romaniſts not only exorciſe demoniacs, but likewiſe houſes and other places which are haunted, as it is called; and this is done in the ſame manner as the exorciſm of perſons.

The ancient heathens practiſed exorciſms, but they were performed by the old women only, who, gadding from houſe to houſe, uſed to ſprinkle them with luſtral water, and lay the ſpirits by certain forms, ſome very whimſical and ridiculous ceremonies. The modern heathens of the Eaſt and Weſt Indies have alſo ſeveral ceremonies among them for caſting out devils and hobgoblins.

EXORDIUM, in rhetoric, is the introduction, preamble, or beginning of any diſcourſe, ſerving to prepare the audience for what is to follow.

The word is Latin, and derived from *ex*, out of, and *ordior*, to begin.

It is a fault into which the ancients have very often fallen, to make an exordium that has no relation to the ſubject in hand: in this the Greeks took more liberty than the Latins. The exordium ſhould be laboured with great care, whence Tully calls it *difficillima pars orationis*. It ſhould be ſimple, and free from too bold metaphors: the ſtile ſhould not be too much raiſed, nor ſhould it run into bombaſt. It was forbidden to make exordiums in the Areopagus at Athens, as it is an indirect and imperceptible manner of prepoſſeſſing the audience. There are two kinds of exordiums, the one juſt and formal, the other vehement and abrupt. In the firſt, the audience is prepared and conducted by due and eaſy ſteps; in the ſecond, the orator breaks out upon his audience at once, as if ſeized with ſome ſudden paſſion. Such is that exordium of Iſaiah, "Hear, O Heavens; and give ear, O Earth!" Abrupt exordiums are the moſt proper on occaſions of extraordinary joy, indignation, &c.

EXOSTOSIS is a preternatural excreſcence of a bone, as often happens in venereal caſes: or rather a protuberance cauſed by a bone's being out of its natural poſition.

The word is Greek, εξοϛωσις, and derived from εξ, off, or out of, and οϛεον, a bone.

EXOTIC, is a term chiefly applied to plants which are foreign, and not of our own growth, particularly thoſe brought from the Eaſt and Weſt Indies: whence the uſe of hot-beds, green-houſes, &c. in order to make them thrive.

The word is Greek, εξωτικος, and derived from εξω, from without, or abroad.

Dr. Liſter, in the Philoſophical Tranſactions, gives an account of exotic diſeaſes, as, 1. The plague, which is properly a diſeaſe of Aſia, where it is epidemic. 2. The ſmall-pox, not known in Europe, or even Aſia-Minor, or Africa, till a ſpice trade was opened to the remoteſt parts of the Indies, where it rages more cruelly than among us. 3. The griping of the guts, which he takes to be peculiar to the Weſt-Indies, and yearly received from thence; which he ſays is quite different from the tormina ventris of the ancients, and is ſcarce ever known in the midland countries, or far in the north of England.

EXPANSION is the opening and ſtretching out of any body; but generally it ſignifies ſuch an alteration as is made by rarefaction, and the quantity of this Dr. Halley gives in the Philoſophical Tranſactions, N°. 197. The law of the expanſion of air is this, that the ſpaces into which air of a given quantity is compreſſed, are reciprocally proportionable to the compreſſing weights.

The word is Latin, *expanſio*, and derived from *ex*, out of, and *pando*, to ſtretch.

Dr. Gregory proves, in his Aſtronomy, that a globe of air, of but one inch in diameter, if it had ſo great an expanſion as it will have at a ſemi diameter's diſtance of the earth from it, would fill all the planetary regions far beyond the ſphere of Saturn.

EX PARTE, a term uſed in the court of chancery, where a commiſſion is taken out and executed by one ſide or party only, upon the other party's neglecting or refuſing to join therein.

When both parties proceed together, it is called a joint commiſſion.

EXPECTANT, in law, ſignifies having relation to, or depending on: thus, where land is given to a man and his wife, and to their heirs, they have a fee ſimple eſtate; but if it be given to them and the heirs of their bodies begotten, they have an eſtate tail, and a fee expantant, which is oppoſed to fee ſimple.

EXPECTORANTS, *Expectorantia*, in medicine, are ſuch things as promote a diſcharge of whatever is offenſive to the lungs and aſpara arteria.

The word is Latin, *expectorans*, and derived from *ex* and *pectus*, the breaſt.

EXPECTORATION, in medicine, is the act of evacuating or bringing up phlegm, or other matter, from the lungs, by coughing, ſpitting, &c.

The word is Latin, *expectoratio*, and derived from *ex* and *pectus*, the breaſt.

EXPEDITATION, in the foreſt-law, is the cutting out the balls of dogs fore-feet, in order to preſerve the king's game.

The word is Latin, *expeditatio*, and derived from *ex* and *pes*, a foot.

EXPENDITORS, the perſons who diſburſe or expend the money collected by the tax for repairs of ſewers, after the ſame is paid into their hands by the collectors, as ordered by the commiſſioners, and for which they are to render accounts when required.

EXPERIENCE, a kind of knowledge acquired by long uſe, without any teacher. Mr. Locke ſays, that men receive all the materials of knowledge from experience and obſervation. See the article Idea.

Experience then conſiſts in the ideas of things we have ſeen or read, which the judgment has reflected on, to form itſelf a rule or method.

EXPERIMENT, in philoſophy, is the trial of the reſult or effect of the applications and motions of certain natural bodies, in order to diſcover ſomething of their motions and relations, whereby to aſcertain ſome of their phænomena, or cauſes.

Torricellian Experiment. See the article Torricellian.

EXPERIMENTAL Philosophy, that philoſophy which proceeds on experiments, which deduces the laws of nature, and the properties and powers of bodies, and their actions upon each other, from ſenſible experiments and obſervations. The buſineſs of experimental philoſophy is to enquire into and inveſtigate the reaſons and cauſes of the various appearances or phænomena of nature, and to make the truth or probability thereof obvious and evident to the ſenſes, by plain, undeniable, and adequate experiments, repreſenting the ſeveral parts of the grand machinery and agency of nature.

In our enquiries into nature we are to be conducted by thoſe rules and maxims which are found to be genuine, and conſonant to a juſt method of phyſical reaſoning; and theſe rules of philophizing are by the greateſt maſter in ſcience, Sir Iſaac Newton, reckoned four, which are as follow:

1. More cauſes of natural things are not to be admitted, than are both true, and ſufficient to explain the phænomena; for nature does nothing in vain, but is ſimple, and delights not in ſuperfluous cauſes of things.

2. And, therefore, of natural effects of the ſame kind, the ſame cauſes are to be aſſigned, as far as it can be done; as of reſpiration in man and beaſts, of the deſcent of ſtones in Europe and America, of

light in a culinary fire and in the ſun, and of the reflection of light in the earth and in the planets.

3. The qualities of natural bodies which cannot be increaſed or diminiſhed, and agree to all bodies in which experiments can be made, are to be reckoned as the qualities of all bodies whatſoever: thus, becauſe extenſion, diviſibility, hardneſs, impenetrability, mobility, the vis inertiæ, and gravity, are found in all bodies which fall under our cognizance or inſpection, we may juſtly conclude they belong to all bodies whatſoever, and are therefore to be eſteemed the original and univerſal properties of all natural bodies.

4. In experimental philoſophy, propoſitions collected from the phænomena by induction, are to be deemed (notwithſtanding contrary hypotheſes) either exactly or very nearly true, till other phænomena occur, by which they may be rendered either more accurate, or liable to exception. This ought to be done, leſt arguments of induction ſhould be deſtroyed by hypotheſes.

These four rules of philoſophizing are premiſed by Sir Iſaac Newton to his third book of the Principia; and more particularly explained by him in his Optics, where he exhibits the method of proceeding in philoſophy, the firſt part of which is as follows.

As in mathematics, ſo in natural hiſtory, the inveſtigation of difficult things, by way of analyſis, ought always to precede the method of compoſition. This analyſis conſiſts in making experiments and obſervations, and in drawing general concluſions from them by induction (i. e. reaſoning from the analogy of things by natural conſequence) and admitting no objections againſt the concluſions, but what are taken from experiments or certain truths: and although the arguing from experiments and obſervations, by induction, be no demonſtration of general concluſions, yet it is the beſt way of arguing which the nature of things admits of, and may be looked on as ſo much the ſtronger, by how much the induction is more general; and if no exception occur from phænomena, the concluſion may be pronounced generally; but if at any time afterwards, any exception ſhall occur from experiments, it may then be pronounced with ſuch exceptions: by this way of analyſis we may proceed from compounds to ingredients, and from motions to the cauſes producing them; and, in general, from effects to their cauſes; and from particular cauſes to more general ones, till the argument ends in the moſt general: this is the method of analyſis: and that of ſyntheſis, or compoſition, conſiſts in aſſuming cauſes, diſcovered and eſtabliſhed as principles, and by them explaining the phænomena proceeding from them, and proving the explanations.

EXPERIMENTUM Crucis, a capital, leading, or deciſive experiment; thus termed, either on account of its being like a croſs, or direction poſt, placed in the meeting of ſeveral roads, guiding men to the true knowledge of the nature of that thing they are enquiring after; or, on account of its being a kind of torture, whereby the nature of the thing is as it were extorted by force.

EXPIATION, a religious act, by which ſatisfaction, atonement, or amends is made for the commiſſion of ſome crime, the guilt done away, and the obligation to puniſhment cancelled.

Great Day of Expiation, an annual ſolemnity of the Jews, upon the tenth day of the month Tiſri, which anſwer to our September.

Expiation, in a figurative ſenſe, is applied by divines to the pardons procured to mens ſins, by the merits of Chriſt's death.

EXPIRATION, in phyſic, that part of reſpiration whereby the air is expelled, or driven out of the lungs. See Respiration.

Expiration is alſo uſed for the end of any term agreed upon. It likewiſe ſignifies death.

EXPLOSION is properly applied to the going off of gunpowder, and the report made thereby; but it is frequently uſed to expreſs ſuch ſudden actions of bodies as have ſome reſemblance thereto; ſuch as the ſudden efferveſcence, ebullition, and expanſion that ariſe from the mixture of ſome contrary liquors; as ſpirit of nitre and ſpirit of wine; oil of vitriol and oil of turpentine; oil of vitriol and ſal ammoniac, &c.

The word is Latin, *exploſio*, and derived from *explodo*, to drive out.

EXPONENT, in algebra, is a number placed over any power, or involved quantity, to ſhew to what height the root is raiſed, in order to contract the work. Thus, $x^4 = xxxx$. Here 4 is the exponent of the power x, and ſhews that it is involved to the fourth power.

The word is derived from the Latin *expono*, to ſhew, or expound.

Exponent *of a Ratio* is the quotient ariſing from the diviſion of the antecedent by the conſequent.

Thus the ratio of 3 to 3 is $1\frac{1}{2}$, and the ratio of 2 to 3 is $\frac{2}{3}$. If the conſequent be unity, the antecedent itſelf is the exponent of the ratio: and, therefore, the exponent of a ratio is to unity, as the antecedent is to the conſequent.

Though the quotient, reſulting from the diviſion of the antecedent by the conſequent, is generally taken for the exponent of the ratio; yet, in reality, the exponent of a ratio ought to be a logarithm. And this ſeems to be more agreeable to Euclid's definition of duplicate and triplicate ratios, than quotients: for 1, 3, and 9, are continual proportionals; now, if $\frac{1}{3}$ be the exponent of the ratio of 1 to 3, and $\frac{3}{9}$, or $\frac{1}{3}$, the exponent of the ratio of 3 to 9, and $\frac{1}{9}$ the exponent of the ratio of 1 to 9; and ſince Euclid ſays, "If three quantities are proportional, the ratio of the firſt to the third is ſaid to be the duplicate of the ratio of the firſt to the ſecond, and of the ſecond to the third;" therefore $\frac{1}{9}$ muſt be the double of $\frac{1}{3}$, which is very falſe. But the logarithm of the ratio of 1 to 9, that is, the logarithm of 9, is the double of the ratio of 1 to 3, or 3 to 9, that is, the logarithm of 3. From whence it appears, that logarithms are more properly the exponents of ratios, than numerical quotients; and of this opinion ſeem Dr. Halley, Mr. Cotes, and others.

EXPONENT, in arithmetic, is uſed in the ſame ſenſe as index or logarithm. See INDEX and LOGARITHM.

EXPONENTIAL CALCULUS, the manner of finding the fluxions, and of ſumming up the fluxions of exponential quantities.

The fluxions of exponential quantities may be readily and eaſily found by the help of the lagarithmic ſeries; and, in order to this, it is neceſſary to premiſe, that the fluxion of any logarithm is equal to the fluxion of the abſolute number or quantity whoſe logarithm it is, divided by the ſame number. Thus, if $x+1$ repreſent any given quantity, the fluxion of the logarithm of this quantity will be $\frac{\dot{x}}{x+1}$. And the fluxion of the logarithm of $xx+yy$, which is expreſſed after this manner, $\dot{\overline{\mathrm{L}:xx+yy}}$, is $\frac{2x\dot{x}+2y\dot{y}}{xx+yy}$. And by the ſame method may the fluxion to the logarithm of any power of a given quantity be determined.

Therefore the fluxions of the logarithms of any powers of the ſame quantity are to one another, as the exponents of thoſe powers: that is, $\dot{\overline{\mathrm{L}:1+x}}:\dot{\overline{\mathrm{L}:1+x}}^{n}::1\,n$. For $\dot{\overline{\mathrm{L}:1+x}}=\frac{\dot{x}}{1+x}$, and $\dot{\overline{\mathrm{L}:1+x}}=\frac{n\dot{x}}{1+x}$. But as $\frac{\dot{x}}{1+x}:\frac{n\dot{x}}{1+x}::1:n$.

Hence we are taught how to find the fluxion of exponential quantities, in the following manner:

Let it be required to find the fluxion of a^x, where a is ſuppoſed to be a conſtant quantity. Put $a^x=y$, then will $\dot{y}$ be equal to the fluxion of a^x; and, becauſe $a^x=y$, therefore $\mathrm{L}:a^x=\mathrm{L}:y$; wherefore $x\,\mathrm{L}:a=\mathrm{L}:y$, and conſequently $\dot{x}\,\mathrm{L}:a+x\,\dot{\overline{\mathrm{L}:a}}=\dot{\overline{\mathrm{L}:y}}$; but $\dot{\overline{\mathrm{L}:a}}=\frac{\dot{a}}{\dot{x}}=1$, becauſe the quantity a is a conſtant quantity, and therefore its fluxion nothing: and $\dot{\overline{\mathrm{L}:y}}=\frac{\dot{y}}{y}$; therefore $\dot{x}\,\mathrm{L}:a=\frac{\dot{y}}{y}$; and $y\,\mathrm{L}:a\,\dot{x}=\dot{y}=a^x$, and conſequently $a^x\,\mathrm{L}:a\,\dot{x}$, is the fluxion of a^x required.

EXPONENTIAL CURVE, is that whoſe nature is expreſſed by an exponential equation.

EXPONENTIAL EQUATION, is that wherein there is an exponential quantity, $a^x=y$.

EXPONENTIAL QUANTITY, is a quantity whoſe power or exponent is a variable or flowing quantity.

Exponential quantities are of ſeveral powers or degrees, according as the exponents themſelves are more or leſs involved. If the exponent be a ſimple quantity, as z^y, it is called an exponential of the firſt or loweſt degree; but when the exponent itſelf is an exponential of the firſt degree, as z^{y^x}, it is called an exponential of the ſecond degree. In like manner, if the exponential itſelf be an exponential of the ſecond degree, as $z^{y^{x^a}}$, it is called an exponential of the third degree,, &c.

EXPORTATION, the ſhipping and carrying out of the kingdom wares and commodities for other countries.

EXPOSITOR, or EXPOSITORY, a title given to ſmall dictionaries, ſerving to explain the hard words in a language.

EX POST FACTO, in law, ſomething done after another: thus, an eſtate granted may be good by matter ex poſt facto, that was not ſo at firſt, as in caſe of election.

EXPOSTULATION, in rhetoric, a warm addreſs to a perſon, who has done another an injury, repreſenting the wrong in the ſtrongeſt terms, and demanding redreſs.

EXPOSURE, in gardening, is the ſituation or aſpect of a garden or wall with reſpect to the ſun and winds, and is therefore as various as the points of the compaſs, being either direct, as eaſt, weſt, north, or ſouth, or declining, as ſouth-eaſt, ſouth-weſt, &c. a garden ſloping to the ſouth, is ſaid to have a ſouth expoſure or aſpect, or a wall with trees facing the eaſt is ſaid to have an eaſt expoſure; the ſouth by eaſt, or ſouth ſouth eaſt points, are generally reckoned the beſt expoſures for gardens, by reaſon they will enjoy the benefit of the morning ſun, and be leſs expoſed to the injuries of the weſt and ſouth-weſt winds, which in this climate are the moſt violent: the next beſt aſpect is the ſouth, particularly if the land is moiſt, but if it is of a dry nature, its product is very apt to be burnt up in hot ſummers, though it extremely well ſuits winter crops. With reſpect to walls, we would give the preference to the ſouth or ſouth-weſt expoſure for tender fruits; for although the eaſtern aſpect receives the invigorating rays of the ſun in the morning, yet the tender bloſſoms are very liable to be deſtroyed by the dry eaſterly winds, which generally prevail at the time the trees are in flower; therefore a wall with trees inclining a little to the weſtward of the ſouth, hath this advantage, that the bloſſoms receive but little damage from the froſts, which melt before the ſun comes to ſhine on them, and fall off like dew, without doing much harm; however, as there will be contrary aſpects, theſe may be planted with ſuch ſorts of fruits as do not require ſo much heat to ripen them; and wherever there are north-aſpected walls, they are only fit for baking pears and plumbs, morello cherries for preſerving; or ſome duke cherries may be thus continued longer in the ſeaſon, as there is a month difference between the ripening on one ſide of the wall and on the other.

EXPRESSED Oils, in chemiſtry, are ſuch as are obtained from bodies only by preſſing.

EXPRESSION, in chemiſtry or pharmacy, denotes the act of preſſing out the juices, or oils of vegetables, which is one of the three ways of obtaining them; the other two are by infuſion and decoction. Oils obtained by means of fire are called diſtillatitious.

Expression, in rhetoric, is the elocution, diction, or choice of words neceſſary to render any diſcourſe eloquent.

Expression, in painting, is the repreſentation of an object according to its natural character and the painter's invention or plan.

EXTASY, a tranſport which ſuſpends the function of the ſenſes, by the intenſe contemplation of ſome extraordinary or ſupernatural object, or when God impreſſes on the imagination the extraordinary ideas of any thing he would reveal.

EXTENSION, in philoſophy, is the quality or property of any thing extended that occupies ſpace. The eſſence of body or quality conſiſts in extenſion, of which there are three ſorts, length, breadth, and depth.

The word is Latin, *extenſio*, and derived from *ex*, and *tendo*, to ſtretch out, or extend.

EXTENSOR, an appellation given to ſeveral muſcles, from their extending or ſtretching the parts to which they belong: ſuch are, 1. The common extenſor of the fingers, which has its origin at the external condyle of the humerus, and the poſterior part of the radius and ulna: it afterwards divides into four tendons, which paſs under the ligament of the carpus, and terminate in the poſterior ſurface of all the phalanges of the fingers, where they are gibbous. 2. The extenſor of the thumb, called alſo bicornis and tricornis, ariſes in the poſterior and middle part of the radius and ulna, and terminates in two or three tendons in the firſt, ſecond, and third phalanx of the thumb. 3. The proper extenſors of each finger, which are a part of it, or at leaſt have their origin with the common extenſor. 4. The long extenſor of the toes, which has its origin in the upper part of the tibia, and in the anterior part of the ligament, between the tibia and fibula: it afterwards divides into five tendons, four of which are inſerted into the four phalanges of the toes, and the fifth into the outer metarſal bone. 5. The ſhort extenſor of the toes ariſes from the upper part of the calcaneum, and dividing into tendons, is inſerted into the toes.

Beſides theſe, there are proper extenſors of the toes; alſo the long and ſhort extenſors of the great toe, and the common extenſor of the back and loins, which is divided into three. If theſe act only on one ſide, they draw the parts obliquely ſideways.

EXTENT, in law, is uſed in a double ſenſe; ſometimes it ſignifies a writ or command to the ſheriff for the valuing of lands or tenements; and ſometimes the act of the ſheriff, or other commiſſioner, upon this writ: but moſt commonly it denotes an eſtimate or valuation of lands; and hence come our extended or rack-rents.

EXTERMINATION *of Qantities*, in algebra. See Equation.

EXTERNAL *Angles*. See the article Angle.

EXTINGUISHMENT, in law, is a conſolidation or union, as where one has due to him a yearly rent out of lands, and afterwards purchaſes the lands out of which the rent ariſes: in this caſe, both the property and the rent being united in one poſſeſſor, the rent is ſaid to be extinguiſhed. Likewiſe, where a perſon has a leaſe for years, and he afterwards buys the property of what is leaſed, the leaſe becomes thereby extinguiſhed.

EXTORTION, in law, is an illegal manner of wreſting any thing from a man, either by force, menace, or authority. It is alſo the exaction of unlawful uſury, winning by unlawful games, and taking more than is due under pretence of right, as exceſſive tolls in millers, &c.

EXTRA-Judicial is when judgment is given in any cauſe that is not depending in that court where ſuch judgment is given, or wherein the judge has no juriſdiction.

EXTRACT, in pharmacy, is the purer part of vegetables, or other natural bodies, that has been ſeparated from the more groſs parts, and diſſolved in ſome proper menſtruum by means of digeſtion, and reduced to a thick and moiſt conſiſtence, by diſtillation or evaporation of the menſtruum.

Extract, in matters of literature, is ſomething copied or collected from a book or paper.

EXTRACTION, in chemiſtry, is the operation whereby eſſences, tinctures, &c. are extracted or drawn from natural bodies.

Extraction, in ſurgery, ſignifies the extracting any foreign matter out of the body, by the help of inſtruments.

Extraction *of Roots*, the method of finding the root of given numbers or quantities. See Root.

The ſquare, cube, and other powers of a number, or root, are formed by multiplying the given number into itſelf a greater or leſs number of times, as the power required is higher or lower. See Power.

This multiplication compounds the powers; and the extraction of the root decompounds them again, or reduces them to their firſt principles or roots. So that the extraction of the root is to the multiplication of the power, what the analyſis is to the ſyntheſis.

Thus, 4 multiplied by 4, produces 16, which is the ſquare of 4; and 16 multiplied by 4, makes 64, which is the cube of 4:—Such is the compoſition of powers.

Again, the ſquare root of 16 is 4, by reaſon 4 is the quotient of 16 divided by 4; and the cube root of 64 is likewiſe 4, by reaſon 4 is the quotient of 64 divided by the ſquare of 4:—Such is the extraction of roots.

Hence, to extract the root out of a given power is the ſame thing as to find a number; e. g. 4, which being multiplied a certain number of times into itſelf, produces the given power, e. g. 16, or 64.

For the extraction of ſquare and cube roots, it is neceſſary to have the ſquares and cubes of all the digits in readineſs, as exhibited in the following table:

Roots	1	2	3	4	5	6	7	8	9
Squares	1	4	9	16	25	36	49	64	81
Cubes	1	8	27	64	125	216	343	512	729

To extract the ſquare root out of a given number:

1°. Divide the given number into claſſes of two figures a-piece, and include each claſs between two dots, commencing with the place of units, or the right-hand figure: the root will conſiſt of ſo many parts or figures as you have claſſes.—By the way obſerve, it may happen that for the laſt claſs on the left hand there ſhall only be one figure left.

2°. Then the left hand claſs being the ſquare of the firſt figure of the root ſought, look in the table of roots for the ſquare roots anſwering to that number; or if that ſquare number be not preciſely there, to the next leſs number: this root write down for the firſt figure of the quotient, and ſubtract its ſquare from the left hand claſs. To the remainder bring down the next claſs towards the right.

3°. Write down the double of the quotient figure under the left hand of the ſecond claſs, and ſeek how often this decuple is contained in the figure over it; the quotient gives the ſecond figure of the root.

4°. Write the ſame quotient under the right hand figure of the ſame claſs, and ſubtract the product of the whole number underwritten, multiplied by the firſt figure of the root, from the number over it, as in diviſion.

5°. This operation being repeated according to the third and fourth ſteps, i. e. the remainder being ſtill divided by the double of the root, as far as extracted; and from the remainder, the ſquare of the figure that laſt came out, with the decuple of the aforeſaid diviſor augmented thereby, being ſubtracted, you will have the root required.

Example. To extract the ſquare root of 99856. Point it after the following manner, 99856: then ſeek a number whoſe ſquare ſhall be equal to the firſt figure 9, viz. 3, and write it in the quotient; then having ſubtracted from 9, 3×3, or 9, there will remain 0; to which ſet down the figures as far as the next point, viz. 98, for the following operation:

Then taking no notice of the laſt figure 8, ſay, How many times is the double of 3 or 6, contained in the firſt figure 9? Anſwer, 1. Wherefore having ſet 1 in the quotient, ſubtract the product of 1×61, or 61 from 98, and there will remain 37, to which connect the laſt figures 56, and you will have the number 3756, in which the work is next to be carried on; wherefore, alſo, neglecting the laſt figure of this, viz. 6, ſay, How often is the double of 31, or 62, contained in 375 (which may be gueſſed at from the initial figures 6 and 37, by taking notice how many times 6 is contained in 37)? Anſwer, 6; and writing 6 in the quotient, ſubtract 6×626, or 3756, and there will remain 0; whence it appears, that the buſineſs is done, the root coming out 316.

```
99856 (316
9
098
 61
 3756
 3756
 ....
```

Otherwiſe, with the diviſors ſet down, it will ſtand thus:

```
     99856(316
      9
   6)098
      61
  62)3756
     3756
     ....
```

Again, if you were to extract the root out of 22178791: Firſt having pointed it, ſeek a number, whoſe ſquare (if it cannot be exactly equalled) ſhall be the next leſs ſquare (or neareſt) to 22, the figures to the firſt point, and you will find it to be 4: for 5×5, or 25, is greater than 22, and 4×4 or 16, is leſs; wherefore 4 will be the firſt figure of the root. This, therefore, being writ in the quotient, from 22 take the ſquare 4×4, or 16, and to

```
22178791 (4709, 43637, &c.
16
 617
 609
   88791
   84681
   411000
   376736
   3426400
   2825649
   60075100
   56513196
   356190400
   282566169
    73624231
```

the remainder 6, adjoin the next figure 17, and you will have 617; from whoſe diviſion, by the double of 4, you are to obtain the ſecond figure of the root, viz. 7, as thus: neglecting the laſt figure 7, ſay, How many times 8 is contained in 61? Anſwer, 7; wherefore write 7 in the quotient, and from 617 take the product of 7 into 87 or 609, and there will remain 8; to which join the two next figures 87, and you will have 887; by the diviſion whereof, by the double of 47, or 94, you are to obtain the third figure; in order to which ſay, How many times is 94 contained in 88? Anſwer, 0; wherefore write 0 in the quotient, and adjoin the two laſt figures 91, and you will have 88791, by whoſe diviſion by the double of 470, or 940, you are to obtain the laſt figure; thus, I ſay, How many times 940 in 8879? Anſwer 9; wherefore write 9 in the quotient, and you will have the root 4709. But, ſince the product 9×9409, or 84681, ſubtracted from 88791, leaves 4110, the number 4709 is not the root of the number 22178791 preciſely, but a little leſs.

If then it be required to have the root approach nearer, carry on the operation in decimals, by adding to the remainder two cyphers in each operation. Thus the remainder 4110 having two cyphers added to it, becomes 411000; the diviſion whereof by the double of 4709, or 9418, you will have the firſt decimal figure 4. Then having writ 4 in the quotient, ſubtract 4×94184, or 376736, from 411000, and there will remain 34264. And ſo having added two more cyphers, the work may be carried on with pleaſure, the root at length coming out 4709,43637, &c.

But when the root is carried half-way or above, the reſt of the figures may be obtained by diviſion alone; as in this example, if you had a mind to extract the root to nine figures, after the five former 4709,4 are extracted, the four latter may be had, by dividing the remainder, viz. 342640, by the double of 4704,4.

After the ſame manner are roots extracted out of decimal numbers.—Thus, the root of 329,76 is 18,159; and the root of 3,2976 is 1,8159; and the root of 0,032976 is 0,18159, and ſo on. But the root of 3297,6 is 57,4247; and the root of 32,976 is 5,74247. And thus the root of 9,9856 is 3,16.

EXTRACTION *of the Cube Root* may be performed by the following method, which admits of two caſes.

Having pointed the number to be extracted, generally called the reſolvend, into claſſes of three figures a-piece, ſeek a cube number that comes the neareſt to the firſt period of the reſolvend, whether it be greater or leſs than that period.

Caſe 1. If the cube number ſo taken be leſs than the firſt period of the reſolvend, call its root leſs than juſt, and ſubtract that cube from the firſt period of the reſolvend.

Caſe 2. But if the cube be greater than the firſt period of the reſolvend, call its root more than juſt, and ſubtract the reſolvend from that cube, annexing cyphers to it.

To the firſt root, whether it be leſs or more than juſt, annex ſo many cyphers as there are remaining points over the whole number of the reſolvend, and multiply it by 3, then make the product a deviſor, by which you muſt divide the difference between the reſolvend and the foreſaid cube, then will that quotient be the reſolvend depreſſed to a ſquare; and therefore it muſt be pointed as ſuch, viz. into periods of two figures each. That being done, make the firſt root (without theſe cyphers that were annexed to it) a diviſor, enquiring how often it may be found in the firſt period of the new reſolvend (as before in extracting the ſquare root) with this conſideration, that if the root (now a deviſor) be leſs than juſt, you muſt annex the quotient figure to it; and then multiply the root ſo increaſed into the ſaid quotient figure; ſetting down the units place of their product under the pointed figure of that period, and ſubtracting it as in diviſion: and ſo on from one period to another as before. But if the ſaid root, now a deviſor, be more than juſt, then you muſt ſubtract the quotient figure from cyphers annexed, or ſuppoſed to be annexed to the ſaid diviſor, multiplying the root ſo reduced into the quotient figure, ſetting down their product as before, &c. An example or two will make the work plain and eaſy.

Example 1.

What is the cube-root of 146363183, the given reſolvend, to be pointed thus:

$14\dot{6}36\dot{3}18\dot{3}$ (5 the firſt root leſs than juſt.
125=the neareſt cube to 146.
500×3=1500) 21363183 (14242, 12 new reſolvend.
1ſt. Div. 5)   14242, 12 (527 the root required.
+2   104
2d. Div. 52)   3842
+7   3689
Root 527   (153) the remainder to be rejected.

Here the root 527 is the true root at the firſt operation, as may be eaſily tried from involving it.

That is, 527 × 527 × 527 = 146363183, the given reſolvend. But if it had not been the true root, then every thing that hath been here done muſt have been repeated, only inſtead of the ſingle root (viz. 5) you muſt have taken the increaſed root, viz. 527; and this I call a ſecond operation, which would increaſe the laſt root to nine places of figures, viz. every operation triples the number of places in the laſt root.

N. B. It often happens that four, and ſometimes five, places of figures may be taken into the root, eſpecially when the ſecond place proves to be a cypher; that is, when the firſt cube comes very near to the firſt period of the reſolvend.

Example 2.

What is the cube root of $6\dot{7}50\dot{7}82\dot{4}23\dot{9}$ (4000 root leſs than juſt.

Firſt neareſt cube $= \underline{64}$

$$\begin{array}{lrl}
\text{Root } 4000\times 3=12000) & & 3507824239\,(292318,68 \\
\qquad\qquad 4) & & \\
 & \underline{+0} & \underline{2\dot{9}2\dot{3}}18,6\dot{8}\ \ (4071,8 \\
\text{1 Diviſor} & 40 & 2923 \\
 & \underline{+7} & \underline{2849} \\
\text{2 Diviſor} & 407) & 7418 \\
 & \underline{+1} & \underline{7418} \\
\text{3 Diviſor} & 4071) & 3347,68 \\
 & \underline{+,8} & \underline{3257{\cdot}44},\ \&c. \\
\text{Root} = & 4071,8 &
\end{array}$$

In this example five figures are taken into the root, becauſe the ſecond place proved to be a cypher, And in theſe five the exceſs is not an unit in the laſt place; for if theſe were made a ſecond operation, the root would be 4071,78, as may be eaſily tried.

EXTRACTION *of the ſquare roots of ſimple algebraic quantities.*

The ſquare root of aa is $+$ or $-\,a$; the ſquare root of $9aa$ is $+$ or $-\,3a$; and that of $4aabb$, is $+$ or $-\,2ab$. This is plain; for the ſquare root of any quantity, ſuppoſe of $4aabb$, is that which, being multiplied into itſelf, will produce $4aabb$. Now $-\,2ab$, multiplied into itſelf, will produce $4aabb$, as well as $+2ab$; and therefore, one quantity is as much its ſquare root as the other. When the ſquare root of a quantity cannot be extracted, it is uſual to ſignify it by this mark $\surd$; thus $\sqrt{2aa}$ ſignifies the ſquare root of $2aa$; thus $\sqrt{aa-4b}$ is the ſquare root of the whole quantity $aa-b$; thus $\dfrac{\sqrt{aa-4b}}{2a}$ ſignifies a fraction, whoſe numerator is the ſquare root of the whole quantity $aa-4b$, and whoſe denominator is $2a$; thus $\sqrt{\dfrac{4ab-a^3}{12a}}$ ſignifies the ſquare root of the whole fraction $\dfrac{4ab-a^3}{12a}$; that is, the ſquare root of both the numerator and denominator.

When the ſquare root of a quantity cannot be extracted, the quantity may ſometimes, however, be reſolved into two factors, whereof the one is a ſquare, and the other is not; and whenever this is poſſible, the root of the ſquare may be extracted, and the radical ſign may be prefixed to the other factor: thus, $12aa = 4aa \times 3$; therefore $\sqrt{12aa} = 2a \times \sqrt{3}$.

EXTRACTION *of the ſquare roots of compound algebraic quantities.*

The extraction of the ſquare root of compound algebraic quantities is ſo very like that of whole numbres in common arithmetic, eſpecially in the caſe of ſeries, where it is chiefly required, that a bare inſpection of the work might be ſufficient: however, take the following directions, with an example.

Let it be required to extract the ſquare root of $x^6+4x^5+10x^4+20x^3+25x^2+24x+16$. Here pointing every other place from the place of units, that is, from 16, I demand the ſquare root of the member belonging to the firſt point to the left hand, that is, of x^6, and the anſwer is x^3, which I put down in the quotient; then I ſquare x^3, and ſubtract the product x^6 from x^6, and there remains nothing: then I bring down the two next members belonging to the next point; to wit, $4x^5+10x^4$, for a reſolvend, and divide it by $2x^3$, the double of the root in the quotient; that is, I divide $4x^5$ by $2x^3$, and the quotient is $2x^2$, which I put down in the quotient; as likewiſe after the diviſor $2x^3$; then I multiply the quantity $2x^3+2x^2$ by its laſt member $2x^2$, and the product $4x^5+4x^4$ I ſubtract from the reſolvend $4x^5+10x^4$, and there remains $6x^4$; to this remainder I bring down the next two places, $20x^3+25x^2$, and ſo have a new reſolvend, which I divide by the double of the root already found, and do as before, till the whole be divided, as you may ſee in the work.

$$\begin{array}{rl}
 & \dot{x}^6+4x^5+\dot{1}0x^4+20x^3+\dot{2}5x^2+24x+\dot{1}6 \\
 & \underline{x^6} \qquad\qquad\qquad\qquad\quad (x^3+2x^2+3x+4 \\
2x^3+2x^2\,) & *+4x^5+10x^4 \\
2x^2\,) & \underline{\quad 4x^5+4x^4} \\
2x^3+4x^2+3x\,) & *+6x^4+20x^3+25x^2 \\
+3x\,) & \underline{\quad 6x^4+12x^3+9x^2} \\
2x^3+4x^2+6x+4\,) & *+8x^3+16x^2+24x+16 \\
+4\,) & \underline{\quad 8x^3+16x^2+24x+16} \\
 & \quad *\qquad *\qquad *\qquad *
\end{array}$$

Otherwiſe thus:

$$\begin{array}{rl}
 & \dot{x}^6+4x^5+\dot{1}0x^4+20x^3+\dot{2}5x^2+24x+\dot{1}6 \\
 & \underline{x^6} \qquad\qquad\qquad\qquad\quad (x^3+2x^2+3x+4 \\
2x^3+2x^2\,) & * \\
+2x^2\,) & \underline{+4x^5+4x^4} \\
2x^3+4x^2+3x\,) & *\ 6x^4 \\
+3x\,) & \underline{\quad 6x^4+12x^3+9x^2} \\
2x^3+4x^2+6x+4\,) & *+8x^3+16x^2 \\
+4\,) & \underline{\quad 8x^3+16x^2+24x+16} \\
 & \quad *\qquad *\qquad *\qquad *
\end{array}$$

Since the laſt member $+16$ was a ſquare, I might have begun the extraction at that end, and the root would have come out the ſame as before, but inverted.—16 is no ſquare number, ſince there is no root, either affirmative or negative, which, when multiplied into itſelf, will produce -16.

Let it be propoſed to extract the ſquare root, or, at leaſt, to reduce the root to the ſimpleſt expreſſion of $12x^3-72x^2+108x$. This quantity, becauſe neither of the extremes are ſquares, muſt be reduced to a more convenient form, thus: If $12x^3$ be divided by $12x$, the quotient xx will be a ſquare number; therefore, I divide the whole by $12x$, and the quotient is $xx-6x+9$. Whence, I conclude, *e converſo*, that if $xx-6x+9$, be multiplied into $12x$, the product will be the quantity propoſed: therefore, $\sqrt{12x^3-72x^2+108x}$ is equal to $\sqrt{xx-6x+9}$ into $\sqrt{12x}$: but $\sqrt{x^2-6x+9,}$ being extracted as above, is $x-3$, or $3-x$; and becauſe $12x=4\times 3x$, we have $\sqrt{12x}=2\times\sqrt{3x}$; therefore $\sqrt{12x^3-72x^2+108x,}=\overline{x-3}$ or $\overline{3-x}$ into $\overline{2\times\sqrt{3x}}=\overline{2x-6}$, or $\overline{6-2x}$ into $\sqrt{3x.}$

If the ſquare root of the factor $xx-6x+9$ could not otherwiſe have been extracted, it might, however, have been obtained by an approximation, as in the following example:

To extract the ſquare root of a binomial by an infinite ſeries. Though the ſquare root of a binomial, as $\overline{a+b}$, $\overline{1-z}$, &c. cannot be expreſſed by any finite number of terms, yet by an infinite ſeries it may.

The ſquare root of the bonomial $1+x$, ſuppoſing x to be leſs than 1, is found by the following operation to be $1+\frac{1}{2}x-\frac{1}{8}x^2+\frac{1}{16}x^3-\frac{5}{128}x^4+$, &c. a ſeries, whoſe regularity is not immediately perceived; but it will appear in the courſe of this work, that theſe ſeries are as regular as any others whatſoever, and as eaſily computed.

$$\begin{array}{rl}
 & 1+x \quad * \quad * \; * \quad * \quad * \quad * \quad * \\
 & \underline{1} \qquad \left(1+\frac{x}{2}-\frac{x^2}{8}+\frac{x^3}{16}-\frac{5x^4}{128}+\text{\&c.}\right. \\
2+\frac{x}{2}\Big) & *+x \\
+\frac{x}{2} & \underline{x+\frac{x^2}{4}} \\
2+x-\frac{x^2}{8}\Big) & *-\frac{x^2}{4} \\
-\frac{x^2}{8} & \underline{-\frac{x^2}{4}-\frac{x^3}{8}+\frac{x^4}{64}} \\
2+x-\frac{x^2}{4}+\frac{x^3}{16}\Big) & *+\frac{x}{8}-\frac{x^4}{64} \\
\frac{x^3}{16} & \underline{\frac{x^3}{8}+\frac{x^4}{16}} \\
2+x-\frac{x^2}{4}+\frac{x^3}{8}-\frac{5x^4}{128}\Big) & *-\frac{5x^4}{64} \\
-\frac{5x^4}{128} & \underline{-\frac{5x^4}{64}} \\
 & *
\end{array}$$

Since in theſe ſeries the powers of x aſcend or deſcend regularly, theſe roots may be extracted by the help of the coefficients only, and the powers may be ſupplied afterwards; but then due care muſt be taken to keep the terms diſtinct, ſo as to place all of the ſame kind orderly one under another, that no confuſion may ariſe in the operation. See BINOMINAL *Theorem.*

EXTRACTION *of the cube root of algebraical quantities.*

The method of extracting the cube root of algebraical quantities differs ſo little from that already delivered for extracting it numerically, that we preſume it will be needleſs to give any examples; we ſhall therefore only add the following theorem, to ſhew the reaſon of theſe operations.

Suppoſe it were required to find the value of $x^3=G$. Put $r+y=G$, ſuppoſing r leſs than the true root; involve $r+y$ to the third power, and we ſhall have $r^3+3rry+3rry+y^3=x^3=G$; and $3rry+3rry+y^3=G-r^3$; and $ry+y^2$ $\frac{y^3}{3r}=D$. Let $\frac{y^3}{3r}$ be rejected as of ſmall value; then it will be $ry+y^2=D$, which gives this theorem $\frac{D}{r+y}=y$. By this theorem, the examples given in extracting the cube root numerically are performed.

EXTRAVASATION, in medicine, is applied to the blood, or any ſort of fluid, when got out of the veſſels in which it ought to be contained.

The word is Latin, *extravaſatio*, and derived from *extra*, out of, and *vas*, a veſſel.

EXTREME *and Mean Proportion*, in geometry, is when a line A B (plate LIII. *fig.* 10.) is ſo divided in C, that the rectangle under the whole line A B, and the leſſer ſegment C B, is equal to the ſquare of the greater ſegment A C. The inveſtigation of which is as follows; let the given line $AB=a$, and for the greater ſegment put x, the leſſer will be $a-x$; then by the hypotheſis $a\times\overline{a-x}=xx$, conſequently, $aa=ax+xx$; and by compleating the ſquare, &c. we ſhall have $x=\sqrt{\frac{5}{4}aa}-\frac{1}{2}a$. Euclid, in lib. 2. prop. 11, gives the ſynthetical demonſtration of this: but this cannot be done exactly in any numbers; but if you would have it tolerably near, add together the ſquare of any number, and the ſquare of its half, and extract as near as you can the ſquare root of the ſum; from whence, taking all the whole number, the remainder is the greateſt part.

EXTREMES, in logic, are thoſe terms in the concluſion of any ſyllogiſm that have a relation to ſome other term as a mean.

EXTRINSIC, among metaphyſicians, is taken in various ſenſes; ſometimes it ſignifies a thing not belonging to the eſſence of another; in which ſenſe the efficient cauſe and end of a thing are ſaid to be ex-

extrinſic. Sometimes it ſignifies a thing's not being contained within the capacity of another, in which ſenſe thoſe cauſes are called extrinſic, which introduce ſomething into a ſubject from without, as where a fire introduces heat. Sometimes it implies a thing added or applied to another, in which ſenſe accidents and adherents are ſaid to be extrinſic to the ſubjects to which they adhere. Sometimes the viſion is ſaid to be extrinſic from ſome form which does not exiſt in that thing, but is adjacent to it, or by ſome means or other without it. See the article INTRINSIC.

EXULCERATION, the ſame as ulcer; but it is generally applied to thoſe eroſions that begin to form an ulcer.

The word is Latin, *exulceratio*, and derived from *ex*, and *ulcer*, a bile.

EXUVIÆ, among naturaliſts, denote the caſt-off parts or coverings of animals, as the ſkins of ſerpents, caterpillars, and other inſects.

EXUVIÆ is alſo uſed for the remains of ſea-animals found foſſile, and more properly called extraneous, or marine foſſils.

EYE, in anatomy, the organ of ſight, or the inſtrument which repreſents viſible objects to the mind.

The whole body of the eye is a kind of teleſcope of infinite perfection, which tranſmits images in an exact and complete manner even to the bottom of it. This bottom is inveſted with textures of nerves, on which the image is imprinted, and by that means the ſenſation is produced, of which one of theſe textures is the immediate organ.

In order to give a clearer idea of the ſtructure of the eye, and the mechaniſm of viſion, let us have recourſe to the camera obſcura, or dark chamber, which the eye in ſome meaſure reſembles.

Shut up a room ſo cloſe as to deprive it entirely of light, then make a hole in one of the window-ſhutters, and oppoſite this hole, at the diſtance of ſeveral feet, place a cloth or ſome white paſte-board, on which all the objects without will be painted in the moſt lively and natural colours, though abſolutely reverſed. If theſe images are deſired to be repreſented in a more exact and more beautiful manner, let a lens be applied to the hole of the window-ſhutter, which, by collecting the rays, will form an image more compact and diſtinct. See CAMERA OBSCURA.

All that is wanting to render the camera obſcura, with regard to ſimple objects, an artificial eye, is the figure of a globe, and having the lens placed within the globe.

In the natural eye the globe or caſe is formed by ſupple membranes, and the lens by tranſparent bodies, and humours equally tranſparent.

The brain and nerves are compoſed, firſt, of a ſoft ſubſtance ſomewhat reſembling new cheeſe; and ſecondly of two integuments of a competent ſolidity, called the dura and pia mater, each of which is manifeſtly double; theſe three ſubſtances form all the nerves.

The principal nerves of the eye, called the optic nerves, make their exit from the cranium, one on each ſide. They derive their origin from thoſe parts of the medullary center of the brain, called the beds of the optic nerves.

Then the two other nerves tend towards the fore part of the head, approaching again one towards the other, and unite as it were in a ſingle nerve, without any croſſing or confuſion: they afterwards ſeparate one from the other, being ſtill incloſed in the pia mater, and inveſted with the anterior lobes of the brain; and after about ſeven lines diſtant from their ſeparation, they each of them enter into a bony cavity that leads to the orbit, the receptacle furniſhed by the brain for the eye: there they receive from the dura mater, the ſheath common to all the nerves. This ſheath confines the nerve, and hinders it from becoming too bulky. This bony entrance forms a canal of about two lines; after which the dura mater is divided into two laminæ; one ſufficiently thin, which lines the orbit, and the other thicker, which continues to ſerve as a ſheath to the nerve. From the angle formed by the diviſion of theſe two laminæ, ariſe the muſcles of the eye.

The coat of the dura mater that accompanies the optic nerve, and concurs to its formation, is continued in the center of the orbit amidſt the muſcles, about the ſpace of fifteen lines, after which it expands and dilates itſelf into a globe, much in the ſame manner as glaſs is blown in a bottle.

At the root of this expanſion, between the nerve and globe, the dura mater forms a circular band, by means of which it ſtrongly compreſſes the extremity of the nerve, and makes a ſort of valve, which ſeems to ſeparate the globe from the nerve, pretty much reſembling the paper ring applied to teleſcopes. It is formed like the valves of the inteſtines by a running fold of this coat; and it is evident that this fold was inevitably at the angle which the dura mater muſt make for the above-mentioned expanſion.

The dura mater, on thus expanding itſelf, forms the firſt, or exterior membrane, of the globe of the eye, called the cornea. The anterior portion of this cornea is tranſparent, and correſponds with the pupil; all the reſt is opaque.

Though the tranſparent cornea be a continuation of the ſclerotis, or opaque cornea, it conſtitutes a part of the ſmaller ſphere, which ſeems added there in the manner chryſtals are to watches. By this means it projects a little beyond the common ſphere of the eye, which circumſtance renders it very well adapted to collect a greater quantity of rays and images, in regard of objects that preſent themſelves ſidewiſe to the eye.

The pia mater, which is ſituated under the dura mater, expands itſelf in a globe like the dura mater, in order to form the internal membranes, or to double the cornea. It alſo forms before its expanſion, a valve or circular band, which ſtrongly compreſſes the extremity of the nerve; but it is divided into two laminæ, one genuine and ſolid, that is applied exactly to the inner ſurface of the cornea, where it is actually complicated and united to the other; the ſecond conſtitutes the choroides or uvea: but this lamina, properly ſpeaking, is only a texture of nerves and blood-veſſels, that go out from the inner ſurface of the true lamina. Theſe veſſels convey a liquid that communicates a black or brown colour to this ſecond lamina. Part of theſe veſſels and nerves open on the internal ſurface of this lamina, and there form, by that means, a downy or mammillary texture loaded with the black liquor theſe veſſels are charged with. Ruyſch has made a particular coat of the choroides; but we ſhall conſider it as the third coat diſtributed by the pia mater to the eye; namely, one truly membranous, united to the ſclerotis; one vaſcular, called the choroides, and one horny, ſtiled tunica Ruyſchii. Towards the fore part of the eye the choroides is doubled; and this exterior complication forms what is called the iris, in the middle of which is the perforation of the pupil. This iris is furniſhed with muſcular fibres, in the form of rays and circles, by means of which the pupil dilates and contracts itſelf. It dilates itſelf in the ſhade, and in a paralytic ſtate of the optic nerves, by the repoſe or ſinking of its fibres, and is contracted when affected by light, particularly a ſtrong one, through the ſwelling of its fibres, into which this ſtrong light determines the ſpirits.

The inner complication of the choroides forms on the hinder part the corona ciliaris in the center of which is incloſed the lens of the eye, called the chryſtalline humour. The corona ciliaris, or ciliary proceſſes, on a cloſe examination, are the laſt nervous and vaſcular tufts or fringes, which expand themſelves on the inner ſurface of the choroides, where they form the ſecond coat, and the corpus mammillare, which is the principal organ of ſenſation. They are plaited at this end like the wriſtband of the ſhirt; inaſmuch as from a large circumference, to which they were extended before, they are reduced to a very ſmall circle, that ſurrounds the chryſtalline humour. Theſe fringes, as they are floating, ſurpaſs a little the bounds of the exterior lamina of which the iris is a continuation.

The external lamina is complicated under the ciliary fibres, where it grows thickiſh and white. In this termination it ſeems to affect approaching to an ungulous nature, as much as can be expected from its delicacy; which indeed is the caſe of almoſt all textures formed by the parallel, cloſe, and compact, beds of nervous fringes.

The whole ſpace of the eye that is before the corona ciliaris and the chryſtalline humour, is filled with a limpid water called the aqueous humour, in the center of which ſwims the iris or pupil; ſo that the iris divides this ſpace into two ſmall chambers, one before, terminated by the tranſparent cornea, or exterior glaſs of the eye; and the other on the back part, a very ſmall one bounded by the corona ciliaris, the chryſtalline humour, or the lens of the eye, and the iris.

Next to theſe two chambers, behind the corona ciliaris and the cryſtalline humour, the globe of the eye forms a ſpace a great deal larger than the preceding ones. This ſpace is all occupied by a ſort of tranſparent jelly, called the vitreous humour. The cryſtalline humour is lodged in the anterior ſurface of the jelly, like a diamond ſet in a ring.

The medullary and interior ſubſtance of the optic nerve is expanded as well as the preceding coats, and forms a fleſhy texture.

This texture conſtitutes the inmoſt membrane of the globe of the eye, called the retina, and terminates at the corona ciliaris. This ſoft ſubſtance of the nerve, at the beginning of its expanſion, forms the ſmall medullary button.

The extremely fine textures that divide the cavity of the eye, and form cells for the humours it is filled with, are the ſame which, in the cavity of the nerve, divide and ſupport the medullary ſubſtance therein exiſting.

Such is the ſtructure of the eye diſcovered by anatomy. But the lights derived from reaſon and analogous aſſiſtances, let us a great way farther into the nature of this wonderful organ. It is evident, that every individual ſenſation is produced by nervous papillæ; and that the fluid which animates theſe papillæ, receives by the glands the preparations and mixtures that fit it for receiving the ſenſation peculiar to each organ. It is well known, that theſe glands and nervous papillæ are often one and the ſame organ, and that they ſometimes even add to the preceding functions the filtration of a ſenſible liquid. The ſtructure is particularly remarkable in the glandulous papillæ of the tongue, that are at once the organs of the ſenſations of taſte, and the recepticles where the ſenſitive fluid receives its character, its mixture, and the reſervoirs of a filtrated liquor neceſſary to this ſenſation. The eye, all wonderful as it is, is nothing elſe but a glandulous papilla, of a larger ſize and expanſion, and hollower than the other glands. It is like them a triple organ of ſenſation, of preparation, of the ſenſitive fluid, and of filtration. The cloſeſt examination poſſible of this nervous papilla does not make it in the leaſt degenerate; on the contrary, it reflects a conſiderable luſtre on the ſtructure and uſe of thoſe papillæ, the univerſal organs of ſenſation. This ſtructure and theſe uſes, that have been hitherto a kind of myſtery, ceaſe almoſt to be ſo in the organ of ſight.

A glandulous papilla is a tuft and end of a nerve, deſtined to the filtration of ſome liquid. The eye is very evidently the extremity of the optic nerve, expanded, and blown, as it were, into a hollow ſphere full of fluids. One may trace the veſſels conveying thoſe fluids which form the expanded coats of the dura and pia mater, where they are interwoven, and open themſelves on the inſide of this organ. The ſize alone of theſe veſſels viſibly demonſtrates the filtration made there of the contained liquid, and the coats and cavity of this organ are nothing elſe than the prop and reſervoir of it.

The inſide of the glands is the concourſe of arterial and nervous extremities, in which concourſe the animal fluid is united to a volatile part of the arterial blood, to enable it to diſcharge its functions. This union is made by means of the nervous and vaſculating tufts: theſe tufts in the eye produce the down of the choroides. It is therefore highly probable, that the black liquid with which this down is imbued, is nothing elſe than the ſulphureous particles of the blood diffuſed in this texture by the tufts of the arteries, and loaded with the volatile portion that is mixed with the animal fluid, conveyed by the nervous tufts. Or, if you pleaſe, this black liquid is the dregs, as it were, of the fluid that reſults from the mixture of the ſpirits with the volatile part of the blood. The animal fluid partakes in ſome degree of the nature of mercury. Now mercury, intimately united with ſulphur, forms a black ſubſtance, an æthiops, as is well known. In like manner, there is the greateſt reaſon to imagine, that the eye preſents to us ſenſible traces of this ſo uſeful mixture; which we eſtabliſh on no other baſis than that of the neceſſity there ſeems to be for it, with reſpect to almoſt all the functions, and principally of muſcular motion.

However, this black liquid, obſervable in the choroides is not peculiar to the eye; we meet with it on the inſide of almoſt all the glands: it is viſible in the glands of the kidneys; for which reaſon they are called capſulæ atrabiliariæ. It is likewiſe viſible in the pulmonary or bronchial glands. In ſhort, the colour of negroes has no other origin than this ſable liquor, with which theſe cutaneous nervous tufts, being very porous, imbue the cuticle that inveſts them.

The down of the choroides, impregnated with the liquid we have been ſpeaking of, forms the inner membrane of the choroides. The exterior lamina this is ſuſtained by, is, in the organ of ſight, what the corpus reticulare is in the organ of the touch, and in that of the taſte. In all theſe organs, the veſſels and nerves, before their expanſion into tufts, are ſtripped of their thick coat; and is is of theſe ſpoils the texture is formed, which in the eye conſtitutes the exterior tunic of the choroides. The nervous papillæ being ſtripped in like manner become more delicate, and endued with a greater ſenſibility; and the textures made of their ſpoils ſerves to ſuſtain the nervous tufts and orifices of the veſſels that convey the neceſſary liquids, as well as the papillæ themſelves, as to the tranſparent humours contained in the globe.

As for the choroides, the veſſels are large enough to admit the ſulphureous particles of the blood to paſs along with the ſpirituous lymph; but beyond this membrane, the minuteneſs of the veſſels ſuffers only an extremely ſubtile lymph to flow, which forms and ſupplies the humours of the eye.

Of theſe the vitreous humour is the moſt conſiderable; it fills about three-fourths of the globe of the eye towards the bottom of that organ, and is condenſed into a jelly; becauſe, being embraced by all the coats of the optic nerve, and immediately by the medullary part of it, the retina, it is impregnated with a large quantity of this enlivening fluid, the property of which is to give a firmneſs and conſiſtence to the ſolids and fluids, where it is found in abundance.

The chryſtalline humour, for the ſame reaſon, ought to have this conſiſtence in a ſtill greater degree. For, beſides the preceding advantages which it has in common with the vitreous humour, its very ſmall circumference receives likewiſe by means of the corona ciliaris the concourſe of all the nervous extremities of the choroides. It muſt therefore be impregnated with a greater quantity of this fluid, and conſequently acquire a larger proportion of conſiſtence.

For the contrary reaſon, the liquid ſituated under the tranſparent cornea, and remote from this great influx of the conſervatory fluid, muſt fall ſhort in point of conſiſtence, and form a fluid of an aqueous nature.

What is very ſurprizing, is the diſpoſal of theſe cauſes to produce effects ſo ſingularly peculiar to the organ they compoſe. A glandulous papilla of the tongue is only the extremity of a nervous fibre. This fibre could only form a nervous button full of a limpid liquor, which indeed was all that was neceſſary for it to do. But this would not have been ſufficient for the organs of ſight; more materials were requiſite: beſides, it is not here a nervous fibre, but an entire and very conſiderable nerve, which expands itſelf at once into a ſingle papilla, and by its thick coats forms a perfect and entire globe, which one would almoſt imagine to be impenetrable even to light itſelf; but this, however, is not true; for the exterior coat, which is the only one thick and ſubſtantial enough to complete the circumference of this globe, is naturally diſpoſed to terminate in a tranparent lamina; and this lamina occurs preciſely at the entrance of the rays; for it can only occur at the extremity of this nervous body, as the nails can be formed only at the ends of the fingers.

The cornea, therefore, does not at all contradict its origin, but follows the common law of the nerves. The farther they recede from their origin, the harder and more compact they grow. The nails are formed by the extremities of the nerves of the legs and arms; theſe nails are hard and tranſparent, and would have an equal tranſparence with the cornea, if, like that, they were inceſſantly moiſtened with fluids. The cornea has no more tranſparence than the nails, when it is once abridged of its uſual ſupply of moiſture. Theſe parts, therefore, have the ſame nature, and the ſame origin.

The rays of light tranſmitted to the eye, ſtand in need of being there refracted, and collected in a particular manner; and an uniform fluid, like what is contained in all the glandulous papillæ, would not have effected that buſineſs agreeable to this organ. But the inner ſubſtance of the larger nerve has provided for this contingency. It is the ſtream of a fluid that gives conſiſtence and ſolidity to all our parts; and its diſtribution is ſuch, that it imparts this conſiſtence preciſely in that order which the perfection of the organ demands.—What a ſimplicity of mechaniſm is here to produce ſuch a prodigy of execution! A nerve expanded into a globe, its coats diſtinctly ſpread over one another, fluids collected under theſe coats by a very ordinary filtration, forms the whole apparatus.

Eye, in architecture, is applied to any round window made in a pediment, an Attic, the reins of a vault, or the like.

Eye, in gardening, ſignifies a little bud or ſhoot inſerted into a tree. See the article Inoculation.

Eye *of a Block*, in naval affairs, that part of the rope-ſtrop which is faſtened to ſome neceſſary place in the ſhip: the ſtrop is a ſort of wreath, or rope, formed into a ring, and fixed round the block for the double convenience of ſtrengthening the block, and faſtening it in any place where it is wanted.

Eye *of a Dome* is an aperture at the top of the dome, as that of the Pantheon at Rome, or of St. Paul's at London; it is commonly covered with a lantern.

Eye *of the Volute*, in architecture, is the center of the volute, or that point in which the helix or ſpiral, of which it is formed, commences: or it is the little circle in the middle of the volute, in which are found the thirteen centers for deſcribing the ſeveral circumvolutions.

Eye *of a Tree*, a ſmall pointed knot to which the leaves ſtick, and from which the ſhoots or ſprigs ſpring forth.

Eye-bright, in botany. See the article Euphrasia.

Eye-Brow, in anatomy, See Supercilium.

Eye-Brow, in architecture, is uſed in the ſame ſenſe as liſt or fillet. See Fillet.

Bull's Eye, in aſtronomy, a ſtar of the firſt magnitude in the conſtellation Taurus. See the article Aldebaran.

EYRE, in law, implies the itinerant courts of juſtice.

The word is formed from the old French, *erre*, *iter*, way, path, or track.

EZEKIEL, the name of a canonical book of the Old Teſtament, referring chiefly to the degenerate manners and corruptions of the Jews of thoſe times.

It abounds with elegant ſentences, and fine compariſons, and abundantly ſhews that the writer was no ſtranger to profane learning.

Ezekiel was carried captive to Babylon with Jechoniah, and began his prophecy in the fifth year of the captivity. He was cotemporary with Jeremiah, who propheſied at the ſame time in Judea. Ezekiel foretold many events, particularly the deſtruction of the temple, the fatal cataſtrophe of thoſe who revolted from Babylon to Egypt, and the happy return of the Jews to their own land.

Ezekiel's *Reed*, or *Rod*, a meaſure of length mentioned by that prophet, and ſuppoſed to be nearly equal to two Engliſh feet.

EZRA, a canonical book of the Old Teſtament, comprehending the hiſtory of the Jews from the time of Cyrus's edict for their return, to the twentieth year of Artaxerxes Longimanus. The author of this book was alſo the publiſher of the canon of the Old Teſtament.

F.

F.

F, The fourth conſonant, and ſixth letter of the alphabet. The letter F is borrowed from the digamma or double gamma of the Ælians, as is evident from the inſcription on the pedeſtal of the coloſſus at Delos; and was undoubtedly formed from the old Hebrew vau: and though this letter is not found in the modern Greek alphabet, yet it was in the ancient one, from whence the Latins received it, and tranſmitted it to us.

F, or FA, in muſic, is the fourth note in riſing in this order of the gamut, *ut*, *re*, *mi*, *fa*. It likewiſe denotes one of the Greek keys in muſic, deſtined for the baſs.

F, in phyſical preſcriptions, ſtands for *fiat*, or let it be done. Thus F. S. A. ſignifies *fiat ſecundum artem*.

F was alſo a numeral letter, ſignifying 10, according to the verſe,

Sexta quaterdenos gerit quæ diſtat ab alpha.

And when a daſh was added at top, thus F̄, it ſignified forty thouſand.

FABA, the bean, in botany, is comprehended by Linnæus among the viciæ: See the articles VICIA and BEAN.

FABER, in ichthyology, a fiſh of the zeus kind, called in Engliſh, doree, or john-dory. See the article ZEUS.

FABIANS, FABII, in antiquity, were prieſts of Pan, who were divided into two bodies, under the names of Quintilians and Fabians, to perpetuate the memory of Quintilius and Fabius, the former of which was head of Romulus's party, and the latter of Remus's.

FABLE, a tale, or feigned narration, deſigned either to inſtruct or divert, diſguiſed under the allegory of an action, &c. Jotham's beautiful fable of the trees is the oldeſt that is extant. Nathan's fable of the poor man and his lamb is the next in antiquity, and had ſo good an effect as to convey inſtructions to the ear of a king. We find Æſop in the moſt diſtant ages of Greece; and, in the early days of the Roman commonwealth, we find a mutiny appeaſed by a fable of the belly and the members. As fables had their riſe in the very infancy of learning, they never flouriſhed more than when learning was at its greateſt height: witneſs Horace, Boileau, and Fontaine.

Fable is the fineſt way of giving council, and moſt univerſally pleaſing, becauſe leaſt ſhocking; for in the reading of a fable, a man thinks he is directing himſelf, whilſt he is following the dictates of another, and conſequently is not ſenſible of that which is the moſt unpleaſing circumſtance in advice. Beſides, the mind is never ſo much pleaſed as when ſhe exerts herſelf in any action that gives her an idea of her own abilities; this natural pride of the ſoul is very much gratified in the reading of fable.

FABLE is alſo uſed for the plot of an epic or dramatic poem; and according to Ariſtotle, it is the principal part and ſoul as it were of a poem. In this ſenſe the fable is defined a diſcourſe invented with art to form the manners by inſtruction, diſguiſed under the allegory of an action. Ariſtotle divides the fable into ſimple and compound; the ſimple having no change of fortune; the compound, which hath a turn from bad fortune to good, and from good to bad. The contrivance of each fable muſt have two parts; namely, the intrigue and diſcovery. Every fable muſt have theſe two parts to be the ſubject of a juſt poem. The compound fable pleaſes moſt, in Ariſtotle's opinion, as having variety: beſides, the fable muſt, to be perfect, be admirable and probable; the admirable is that part of it which is contrary to the ordinary courſe of nature; the probable is whatever ſuits with the common opinion. But the moſt part of thoſe that compoſe poems, by too great a paſſion to create admiration, take not ſufficient care to temper it with probability. Almoſt all the ancient poets, however judicious in other reſpects, have been guilty of this fault; not to ſpeak of the moderns. Probability gives credit to whatever is moſt fabulous in poetry; it ſerves alſo to give a greater luſtre and air of perfection than even truth itſelf; for truth repreſents things only as they are, but probability as they ought to be.

Dr. Trapp obſerves, though fable, action, and deſign, are often uſed indiſcriminately, they have each diſtinct ideas; defining fable, a compoſition of epiſodes and other things which are ſubſervient to the carrying on the action and bringing it to a concluſion.

FABRIC, the ſtructure or conſtruction of any thing, particularly a houſe, hall, church, &c.

The word is Latin, *fabrica*, and derived from *faber*, a workman.

FABULOUS, ſomething conſiſting of, or connected with, a fable. See FABLE.

FABULOUS *Age*, among ancient hiſtorians. See the article AGE.

FACADE, in architecture. See FACE.

FACE, in anatomy. See the article HEAD.

FACE, in architecture, the front of a building, or the ſide which contains the chief entrance. It is alſo ſometimes uſed for the ſide which it preſents to the ſtreet, garden, court, &c. and ſometimes for any ſide oppoſite to the eye.

FACE *of a ſtone*, in maſonry, that ſuperficies of it which lies in the front of the work.

FACE, in fortification, an appellation given to ſeveral parts of a fortreſs, as the face of a baſtion, &c. See BASTION.

The face of a place is the front comprehended between the flanked angles of two neighbouring baſtions, being compoſed of a curtain, two flanks, and two faces; and is likewiſe called the tenaille of a place. In a ſiege, the attacks are carried on againſt both baſtions, when the whole tenaille is attacked.

Prolonged FACE, that part of the line of defence-razant, which is between the angle of the ſhoulder and the curtain, or the line of defence-razant, diminiſhed by the length of the face.

FACE *of a Gun*, the ſuperfices of the metal at the extremities of the muzzle of the piece.

FACE, in the military art, a word of command, intimating to turn about; thus, *face to the right*, is to turn upon the left heel a quarter-round to the right; and, *face to the left*, is to turn upon the right heel a quarter-round to the left.

FACE *of Plants*, among botaniſts, ſignifies their general appearance, which, being nearly the ſame in plants of the ſame genus, ſerves to diſtinguiſh them at firſt ſight.

FACET, or FACETTE, among jewellers, the name of the little faces or planes to be found in brilliant and roſe diamonds. See the article DIAMOND.

FACTION, a cabal or party formed in a ſtate, city, or company.

FACTION, in antiquity, a name given to the different companies of combatants in the circus.

FACTITIOUS, is any thing made by art, and is uſually taken in oppoſition to natural. Thus ſope is a factitious body or concrete, but fullers-earth is a natural one.

The word is Latin, *factitius*, and derived from *facio*, to do or perform.

FACTOR, in commerce, is an agent or correſpondent reſiding beyond the ſeas, or in ſome remote part, commiſſioned by merchants to buy or ſell goods on their account, or aſſiſt them in carrying on their trade.

FACTOR, in multiplication, a name given to the multiplier and multiplicand, becauſe they conſtitute the product. See the article MULTIPLICATION.

FACTORAGE, called alſo commiſſion, is the allowance given to factors by the merchant who employs them.

FACTORY, is a place where a conſiderable number of factors reſide to negotiate for their maſters or employers.

FACTUM, in arithmetic, the product of two quantities multiplied by each other.

FACULÆ, in aſtronomy, are ſhining parts which the moderns have ſometimes obſerved upon the ſun's diſk; but they are very ſeldom ſeen.

The word is Latin, from the plural of *facula*, a little torch.

Kircher and Scheiner conceive them to be a ſort of volcanos in the body of the ſun. But Huygens and others attribute the cauſe of theſe phænomena to the tremulous agitation of the vapours near our earth; the ſame as ſometimes ſhew a little unevenneſs in the circumference of the ſun's diſk, when viewed through a teleſcope.

FACULTY, in law, a privilege granted to a perſon, by favour and indulgence, of doing what, by law, he ought not to do.

FACULTY, in the ſchools, a term applied to the different members of an univerſity, divided according to the arts and ſciences taught there.

FACULTY *of Advocates*, a term applied to the college or ſociety of advocates in Scotland, who plead in all actions before the court of ſeſſion.

FACULTY is alſo uſed to denote the powers of the human mind, viz. underſtanding, will, memory, and imagination. See the article UNDERSTANDING, &c.

FÆCES, properly the lees or grounds of any fermented liquor; but generally, in medicine, it is underſtood of wine; though the ſediment of any liquid is called fæx or fæces: by this is alſo underſtood the excrements of the belly.

FÆCES, in chemiſtry, whatever remains in the veſſel after diſtillation, &c.

FÆCULA, in pharmacy, a medicine which conſiſts of the fæces of vegetable juices, chiefly thoſe of roots.

The word is Latin, being a diminutive of *fæx*, ſediment, or lees.

FÆCULENT, in general, is applied to things abounding with fæces, or dregs: thus the blood and other humours of the human body, are ſaid to be fæculent, when without that purity which is neceſſary to health.

FAG-END, in the ſea-language, the end of any rope which is untwiſted and looſened by frequent uſe: to prevent this, the ends of ropes are generally well faſtened by binding a piece of ſmall cord or packthread around them, which is called whipping them.

FAGONA, in anatomy, a conglomerate gland, the ſame with thymus. See THYMUS.

FAGONIA, in botany, a genus of plants whoſe flower conſiſts of a ſmall pentaphyllous calyx, with five heart-ſhaped patent petals, and ten erect ſubulated filaments topped with roundiſh antheræ. The fruit is a roundiſh acuminated capſule, compoſed of ten valves, which form five lobes and as many compreſſed cells, each containing a ſingle roundiſh ſeed.

FAGOPYRUM, buck-wheat, in botany. See BUCK-WHEAT.

FAGOTTINO, in muſic, is a ſingle curtail, a muſical inſtrument ſomething like a baſſoon. See BASSOON.

FAGOTTO, in muſic, the double curtail, or in reality, a double baſſoon, as big again as the former.

FAGUS, the beech, in botany. See BEECH-TREE.

FAILURE, a ſpecies of bankruptcy, commonly called breaking, or ſtopping payment. See BANKRUPTCY.

FAINT-ACTION, in law, a feigned action, or ſuch as, although the words of the writ are true, yet, for certain cauſes, the plaintiff has no title to recover thereby.

FAINT-PLEADER, in law, a covinous, falſe, or colluſory manner of pleading, to the deceit of a third perſon.

FAINTING. See LYPOTHYMIA.

FAIR, a greater kind of market, granted to a town, by privilege, for the more ſpeedy and commodious providing of ſuch things as the place ſtands in need of. See the article MARKET.

FAIRY, or FARY, in ancient traditions and romances, denotes a kind of imaginary genii, converſant on earth, and diſtinguiſhed by abundance of fantaſtical actions and offices, good or evil. Fairies are of oriental extraction, and ſeem to have been invented by the Perſians and Arabs, whoſe hiſtory and religion abound with tales of fairies and dragons. The Perſians call them Peri, the Arabs Ginn, having a peculiar country which they ſuppoſe them to inhabit, called Ginniſtan, by us Fairy-land.

Spenſer's Fairy Queen is an epic poem, under the perſons and characters of the fairies. In this kind of writing, the poet loſes ſight of nature, and entertains his readers with characters of fairies, witches, magicians, demons, and departed ſpirits. It requires an odd turn of thought, and an imagination naturally fruitful and ſuperſtitious. The poet ought likewiſe to be well verſed in legends, fables, antiquated romances, and the tradition of our nurſes, in order to fall in with thoſe natural prejudices and notions which we have imbibed in our infancy.

The whole ſubſtance of this poetry owes its original to the darkneſs and ſuperſtition of later ages, when pious frauds were made uſe of to amuſe or frighten mankind into a ſenſe of their duty. Among the Engliſh poets, Shakeſpeare has incomparably excelled all others, particularly in his Macbeth, his Midſummer Night's Dream, &c.

FAIRY-CIRCLE, or RING, is a phænomenon pretty frequent in the fields, &c. being a kind of circle, which the vulgar ſuppoſe to be traced by the faires in their dances.

There are two kinds of it: one of about three yards in diameter, containing a bare path about a foot broad, with graſs growing in the middle. Meſſ. Jeſſop and Walker, in the Phil. Tranſ. aſcribe them to lightning, which is confirmed by their being moſt frequently found after ſtorms of that kind, as well by the colour and brittleneſs of the graſs's roots, when firſt obſerved. Lightning, like all other fires, moves round and burns more in the extremity than the middle; the ſecond circle ariſes from the firſt, the graſs burnt up growing more plentifully afterwards. Others maintain that theſe circles are made by ants, which are frequently found in great numbers therein.

FAITH, *fides*, in antiquity, was deified by the Romans, and had a temple in the Capitol.

FAITH, in divinity and philoſophy, the firm belief of certain truths upon the teſtimony of the perſon who reveals them.

Confeſſion of FAITH. See CONFESSION.

FAITHFUL, an appellation aſſumed by the Mahometans. See MUSSELMEN.

FAKE, among ſailors, when a cable or other rope is laid in a proper diſpoſition for ſtowage aboard-ſhip, it is winded round and round in a ſerpentine revolution; this winding is called coiling, and each of the turns thereof is called a fake; ſix or eight fakes compoſe what is called a tier; and the whole cable conſiſts of a greater or leſs number of theſe tiers, which lie all above one another in the manner deſcribed, according to the room or extent of ſpace in which it is coiled.

FAKIR, in pagan theology, a kind of Indian monks, who even outdo the mortifications and ſeverities of the ancient Chriſtian anchorets.

FALCATED, ſomething in the form of a ſickle; thus, the moon is ſaid to be falcated when ſhe appears horned. See the articles MOON and PHASIS.

FALCO, in ornithology, a genus of birds, of the order of the accipitres, with three toes always before, an only one behind.

This genus comprehends the falcon kind, properly ſo called, the hawk, gyrfalcon, eagle, buzzard, pygargus, lannar, kite, keſtril, &c.

FALCON, or Faucon, in gunnery, a piece of cannon. See the article Cannon.

FALCONET, or Fauconet. See the article Cannon.

FALCONRY, the art of taming, managing, and tutoring hawks and falcons to catch their prey.

The word is French, *fauconerie*, which ſignifies the ſame.

The terms of falconry, and what we know of the art itſelf, we borrow from the French. The grand ſeignior uſually keeps ſix thouſand falconers in his ſervice; and the French king has a grand falconer. Hiſtorians take notice of this poſt as early as 1250. Falconry, as now practiſed, was unknown to the Greeks and Romans.

FALDAGE, an ancient privilege reſerved to lords, of ſetting up folds for ſheep in any fields within their manors, for the better manuring the ſame; and this, in former times, was uſually done as well with their tenants ſheep, as with their own.

FALDFEY, or Faldfee, a rent or fee paid by ſome cuſtomary tenants, for liberty to fold their ſheep on their own lands.

FALL, the deſcent of a heavy body towards the center of the earth. See the articles Descent, Gravity, Acceleration, &c.

Fall is alſo the name of a meaſure of length uſed in Scotland, and containing ſix ells of that country. See Measure and Ell.

FALLACY, a deception, fraud, or falſe appearance.

Fallacy, or *Syllogiſtical* Fallacy, in logic, a captious argument, which, on account of its apparent goodneſs or defect, is made uſe of to deceive a reſpondent not well verſed in the art of ſophiſtry. See the article Sophism.

FALLING-Sickness, the ſame with epilepſy. See Epilepsy.

FALLOPIAN Tubes, in anatomy, are appendages of the uterus.

FALLOW, a pale red colour, like that of brick half burnt: ſuch is that of a fallow deer. See the article Deer.

Fallow-Field, or Fallow-Ground, land laid up, or that has lain untilled for a conſiderable time.

FALLOWING *of Land*, a particular method of improving land.

The great benefit of fallowing appears by the common practice of landlords, who every where take care to oblige their tenants to a ſtrict obſervance of it once in three years; few lands being able to bear two crops without it. It appears that none will find a year's fallowing a loſs to them, let their land be what it will: but, more particularly, the advantage of fallowing conſiſts in, firſt, its laying the land in ridges, and its expoſing it to the froſt, wind, ſun, and dews, all which ſweeten and mellow the land very much; the often ſtirring of it, and breaking the clots, diſpoſe it for the bearing of good crops. Secondly, it kills the weeds, by turning up the roots to the ſun and air; and kills not only the weeds that grew with the laſt corn, but wild oats, darnel, and other weeds that ſow themſelves, and that as ſoon as they begin to peep out of the ground; ſo that they have no time to ſuck out any of the heart of the land.

FALSE, in general, ſomething contrary to truth, or not what it ought to be: thus we ſay, a falſe witneſs, falſe action, falſe weights, falſe claim, &c. See the articles Witness, Action, &c.

False *Impriſonment*. See Imprisonment.

False *Judgment*. See Judgment.

FALSHOOD, in philoſophy, an act of the underſtanding, repreſenting a thing otherwiſe than it is as to its accidents.

FALX, in anatomy, is a duplicature of the dura mater; ſo called from its curvature. See Brain.

The word is Latin, and literally ſignifies a ſickle.

FAMILIARS *of the Inquiſition*, are people that aſſiſt in the apprehending of ſuch perſons as are accuſed, and to carry them to priſon. See the article Inquisition.

FAMILY, *Familia*, denotes the perſons that live together in one houſe, under the direction of one head or chief manager. It alſo ſignifies the kindred or lineage of a perſon, and is uſed by old writers for a hide or portion of land ſufficient to maintain one family. See the article Hide.

Family, in natural hiſtory, a term uſed by authors to expreſs any order of animals, or other natural productions of the ſame claſs. See Class and Order.

Family *of Curves*. See Curve.

FAN, a machine uſed to raiſe wind and cool the air by agitating it.

Fan is alſo uſed as an inſtrument for winnowing corn.

FANATICS, wild, enthuſiaſtic, viſionary perſons, who pretend to revelation and inſpiration.

FANCY, or Imagination. See Imagination.

FANIONS, in the military art, ſmall flags carried along with the baggage.

FANUM, Temple. See Temple.

FAPESMO, a form of ſyllogiſm, wherein the major or firſt propoſition is an univerſal affirmative, the minor an univerſal negative, and the concluſion a particular negative.

FARCE, originally implied thoſe little pieces of drollery exhibited by mountebanks and their buffoons, in the open ſtreets, to gather the people together.

The word is French, and ſignifies forced meat or ſtuffing.

Farce is at preſent of more dignity; it is removed from the ſtreet to the theatre, and inſtead of being performed by merry-andrews to amuſe the rabble, is acted by comedians, and become the entertainment of a polite audience. Poets have reformed the wildneſs of the primative farces, and brought them to the taſte and manner of comedy. The difference of the two upon the Engliſh ſtage is, that comedy keeps to nature and probability, and therefore is confined to certain laws preſcribed by ancient critics; whereas farce diſallows of all laws, or rather ſets them aſide on occaſion. Its end is purely to make merry, and it ſticks at nothing that may contribute thereto, however wild and extravagant. Hence the dialogue is uſually low, the perſons of inferior rank, the fable or action trivial or ridiculous, and nature and truth every where exaggerated to afford the more palpable ridicule. The ancient farces ſeem to have been a true imitation of the antique mimes. Our modern farces are now denominated entertainments.

FARCIMINALIS TUNICA, in anatomy, the ſame with the allantois. See ALLANTOIS.

FARCIN, or FARCY, in farriery, a diſtemper of the blood-veſſels, which generally follows the courſe of the veins, and, when inveterate, thickens their coats and integuments.

FARDING-DEAL, the fourth part of an acre of land. See the article ACRE.

FARE moſt commonly ſignifies the money paid for a voyage or paſſage by water; but, in London, it is what perſons pay for being conveyed from one part of the town to another in a coach or chair.

FARINA, a Latin term ſignifying meal, or the flour of corn.

FARINA FOECUNDANS, among botaniſts, the impregnating meal or duſt on the apices or antheræ of flowers, which being received into the piſtil, uterus, or ſeed-veſſel of plants, fecundates the rudiments of the ſeeds in the ovary, which otherwiſe would decay and come to nothing. See the article GENERATION *of Plants*.

FARLEY, or FARLIEU, money paid by tenants in the weſt of England, in lieu of a heriot. See the article HERIOT.

FARM, or FERM, ſignifies the chief meſſuage in a village, or any large meſſuage whereto belongs land, meadow, paſture, wood, common, &c. and which has been uſed to lett for term of life or years, under a certain yearly rent payable by the tenant for the ſame.

FARMER, the perſon who occupies or is leſſee of a farm, whether for life or years.

FARMER, among miners, ſignifies the lord of the field, or the perſon who farms the lot and cope of the king.

FARRIER, one whoſe employment is to ſhoe horſes, and cure them when diſeaſed or lame.

FARRIERY, the art of trimming the feet, and curing diſeaſed horſes. See HORSE.

FARTHING, the leaſt copper coin uſed in Britain, being half of the half-penny. See the article EXCHANGE.

FASCES, in Roman antiquity, axes bound up together with rods or ſtaves, and carried before the Roman magiſtrates as a badge of their authority and office.

FASCETS, in the art of making glaſs, are the irons thruſt into the mouths of bottles, in order to convey them into the annealing tower.

FASCIA, in architecture, ſignifies any flat member having a conſiderable breach and but a ſmall projecture, as the band of an architrave, larmier, &c.

Faſcias, in brick buildings, are certain juttings out of the bricks over the windows of each ſtory, except the upper one. Theſe are ſometimes plain, like thoſe of columns; but ſometimes they are moulded, and the moulding is uſually a ſcima reverſa at the bottom, above which are two plain courſes of bricks, then an aſtragal, and laſtly, a boultin. See the articles ASTRAGAL and BOULTIN.

FASCIA LATA, in anatomy, the name of a muſcle, or muſcular ligament.

It is very conſiderable for its extent and ſtrength, being compoſed principally of two planes of fibres, of which the external are more or leſs longitudinal; the internal more or leſs tranſverſe. It is further ſtrengthened in ſome places by a great number of other fibres, which augment its thickneſs, and form particular expanſions. The tranſverſe fibres are much ſtronger than the longitudinal.

It is fixed above to the criſta of the os ilium, from the large tuberoſity, to the anterior ſuperior ſpine, to the ligamentum Fallopii, and to the aponeuroſis of the obliquus externus of the abdomen, on which it runs up by a thin lamina. It is likewiſe fixed in the lateral inferior part of the os ſacrum, and to the neighbouring parts of the ligaments, by which that bone is connected to the ilium and iſchium.

From thence it advances over the glutæi and thigh, between the membrana adipoſa and muſcles, down to the anterior and outer parts of the knee. It is very thin on the patella: it is alſo continued over the external anterior part of the tibia covering the muſcles thereof, and is ſtrongly inſerted in the head and criſta of that bone, and in the upper part of the fibula.

It ſends off elongations, which, like ſcepta, run in between the muſcles, and ſometimes meet ſo as to form vaginæ. It is ſtrongeſt on the anterior and outer parts of the thigh, growing gradually thinner on the inner and back parts.

It is ſtrongly inſerted in the linea femoris aſpera, between the vaſtus externus and biceps, forming a ſeptum between theſe. It furniſhes particular vaginæ to the muſcles, on the inſide of the thigh, which vaginæ, though thin, are pretty ſtrong, principally conſiſting of tranſverſe fibres.

The muſculus FASCIÆ *Lata* is a ſmall and pretty long muſcle, ſituated ſomewhat obliquely upward and downward, on the fore-part of the hip. It is fixed above to the outſide of the anterior ſpine of the ilium, between the inſertions of the glutæus medius and ſartorius. Thence its fleſhy fibres run down a little obliquely backward, forming a very flat body, four fingers breadth in length, and two in breadth.

This body lies between two laminæ of the faſcia, and is inſerted therein by ſhort tendinous fibres, which diſappear, at that place where the faſcia adheres to the great trochanter and tendon of the glutæus maximus. *Winſlow's Anat.*

FASCIÆ, in aſtronomy, ſeveral rows of bright ſpots on Jupiter's body, reſembling belts or ſwaths.

Theſe faſciæ or belts are more lucid than the reſt of the planet's diſk, and are terminated by parallel lines. Some have imagined that they are long canals of ſome fluid matter, or water; and, becauſe they have diſcovered ſeveral dark ſpots on his diſk, they conclude that the planet's ſurface is divided into land and water, like that of our globe.

FASCIALIS, in anatomy, is the ſame with faſcia lata. See FASCIA LATA.

FASCICULUS, in medicine, denotes a handful; or, according to others, as much as can be taken up between two fingers and the thumb.

The word is Latin, being a diminutive of *faſcis*, a bundle.

FASCINATION, a kind of witchcraft or enchantment, ſuppoſed to operate by the influence either of the eye or tongue.

FASCINES, or FAGGOTS, in fortification, are ſmall branches of trees or bavens bound up in bundles, which are uſed in an army, in order to cover themſelves, and burn the enemies lodgments; and which, when mixed with earth, ſerve to fill up ditches, mend roads, &c.

FASHION, a term uſed among artificers in gold and ſilver, for the trouble, time, and labour employed in a piece of work. It is by the faſhion that workmens wages are regulated.

FASHION-PIECES, in ſhip-building, the aftmoſt or hindmoſt of the timbers of a ſhip, which limit the breadth and form the ſhape of the ſtern. See the article SHIP-BUILDING.

FAST, or FASTING, in general, denotes the abſtinence from food; but is more particularly uſed for ſuch abſtinence on a religious account.

FAST-DAYS, thoſe appointed, by public authority, to be obſerved in faſting and humiliation.

FAST-GROUND, or FAST-COUNTRY, among miners, denotes the ſame with ſhelf. See the article SHELF.

FASTERMANS, among our Saxon anceſtors, were pledges or bondſmen, who were anſwerable for each other's good behaviour.

FASTI, in Roman antiquity, the calendar wherein were expreſſed the ſeveral days of the year, with their feaſts, games, and other ceremonies.

FASTI CONSULARES, a tablet or chronicle, wherein the ſeveral years were denoted by the reſpective conſuls, with the principal events that happened during their conſulſhip. And hence, the term faſti is ſtill applied to the archives and public regiſters of a nation.

FASTIGIUM, in architecture, the ſame with pediment. See PEDIMENT.

FAT, in anatomy, an oily, ſulphureous part of the blood, depoſited in the cells of the membrana adipoſa, from the innumerable little veſſels which are ſpread amongſt them.

This fat is to be found immediately under the ſkin, in all the parts of the body, except the forehead, eye-lids, lips, upper-part of the ear, penis, and ſcrotum. In ſome bodies the veſicles of the membrana adipoſa are ſo full, that the fat is an inch or more thick; and in others they are almoſt flat, containing little or no fat. There are two ſorts of fat, one white, or rather yellow, ſoft and lax, which is eaſily melted, and is called pinguedo; another white, firm, brittle, and which is not ſo eaſily melted, called ſebum, ſuet or tallow. Some reckon the marrow of the bones for a third ſort of fat.

Dr. Grew takes the fat of animals to be a curdling or coagulating of the oily parts of the blood, either by ſome of its own ſaline parts, or by the nitrous particles of the air mingled therewith: whence it is that ſome animals, as rabbits and field hares, grow fat in froſty weather: and for the ſame reaſon it is, that the fat of animals is hard; whereas that of fiſhes is ſoft, and runs all to oil, becauſe the water in which they live, hath but few nitrous particles in it, in compariſon of air.

FAT, or VAT, is alſo uſed for ſeveral utenſils, as, 1. A large wooden-veſſel, uſed for the meaſuring of malt, and containing a quarter, or eight buſhels. 2. A large brewing-veſſel, uſed by brewers to run their wort in. 3. A leaden-pan or veſſel for the making of ſalt at Droitwich.

FAT likewiſe denotes an uncertain meaſure of capacity. Thus a fat of iſinglaſs contains from three hundred and a quarter to four hundred weight; a fat of unbound books, half a maud or four bales; of wine, from twenty to twenty-five hundred weight; and of yarn, from two hundred and twenty, to two hundred and twenty-one bundles.

FATE, or DESTINY, is ſomething that is ſuppoſed to infer the neceſſity of any event, the cauſe of which we are but very little acquainted with, and which ariſes from a power ſuperior to any that is ſubject to man.

The Stoics who admitted a providence, did, however, ſubject it to fate; and yet they did not make it more inflexible than the predeſtination of the Calviniſts.

FATHER, a term of relation denoting a perſon who hath begot a child.

FATHER, in theology, is uſed in ſpeaking of the firſt perſon of the Trinity. See the article TRINITY.

FATHER is alſo uſed in ſpeaking of ſpiritual and moral things. Thus Abraham is called the father of the faithful.

FATHER, in church hiſtory, is applied to ancient authors who have preſerved in their writings the tradition of the church.

FATHER is alſo a title of honour given to prelates and dignitaries of the church, to the ſuperiors of convents, to congregations of eccleſiaſtics, and to perſons venerable for their age and quality.

FATHER-LASHER, a name given by the inhabitants of Cornwall to a fiſh of the cottus kind, with the upper-jaw longeſt, and a prickly head.

FATNESS. See the article CORPULENCY.

FATTENNING of oxen, horſes, ſwine, poultry, &c. See the articles OX, HORSE, &c.

FAVIFORM, in general, ſomething reſembling a honey-comb. Surgeons give this appellation to certain ulcers, which emit a ſanies through little holes, eſpecially in the head. See HONEY-COMB.

FAUNALIA, in Roman antiquity, three annual feſtivals in honour of the god Faunus, the firſt of which was obſerved on the ides of February; the ſecond on the ſixteenth of the calends of March; and the third on the nones of December.

FAUNS, FAUNI, or SATYRS, were a kind of rural deities, or rather demi-gods, among the Romans, and inhabited the woods; wherefore they were called ſylvani; they were companions of Pan or Faunus. They were not known among the Greeks. The Latins repreſented them half man and half goat, with the horns, ears, feet, and tail of a goat, a flat noſe, and with hair on their bodies. The wild pine and olive were conſecrated to the Fauns. We find ſome authors ſo ridiculous as ſeriouſly to examine, whether there were ſuch animals whoſe bodies were part man and part beaſt!

FAUSSE-BRAYE, in fortification, is a mount or rampart, of four fathoms width, on the outſide of the firſt rampart, that goes quite round the place, in order to defend the foſſe; and is covered with a parapet. It is made uſe of to fire upon the enemy, when advanced ſo far as not to be driven off the parapet from the body of the place; and it alſo ſerves to receive the ruins which the cannon make in the body of the place.

FAWN, among ſportſmen, a buck, or doe, of the firſt year; or the young one of the buck's breed in its firſt year.

FEALTY, in law, an oath taken on the admittance of any tenant, to be true to the lord of whom he holds his land: by this oath the tenant holds in the freeſt manner, on account that all who have fee, hold *per fidem et fiduciam*, that is, by fealty at the leaſt.

FEAST, or FESTIVAL, is applied now to any ſolemnity or feſtivity; but, in the church, it ſignifies thoſe days which are obſerved in honour of God, or of ſome ſaint.

FEATHER, *Pluma*, the part which covers birds, and enables them to fly. See BIRD.

FEATHER, in horſemanſhip, a ſort of natural frizzling of the hair, which in ſome parts riſes above the reſt, reſembling the tip of an ear of corn. This happens moſt frequently between the eyes; and if lower, it is a ſign of a weak ſight.

A feather upon a horſe's neck, is called a Roman feather; being a row of hair turned back, and forming a mark like a ſword-blade near the mane.

Mid-FEATHER, in the ſalt-works, the partition in the middle of the furnace, which it divides into chambers.

FEATHER-EDGED, among carpenters, an apellation given to planks or boards, which have one ſide thicker than the other.

Prince's FEATHER, a plant otherwiſe called amaranth. See the article AMARANTH.

FEBRIFUGES, in medicine, are ſuch things as mitigate or remove a fever; they are otherwiſe called antifebrilia.

The word is Latin, *febrifuga*, and derived from *febris*, a fever, and *fugo*, to remove, or drive away.

FEBRIS, FEVER, in medicine. See FEVER.

FEBRUARY, the ſecond month in the year, reckoning from January. It was added to Romulus's calendar by Numa Pompilius.

The word is Latin, *Februarius*, and derived from *februa*, which was a certain kind of ceremony performed in that month, in which wax candles and flambeaux were lighted at the graves of the dead, and oblations made to their names.

FECIALES, or FOECIALES, a college of prieſts inſtituted at Rome by Numa, conſiſting of twenty perſons, ſelected out of the beſt families. Their buſineſs was to be arbitrators of all matters relating to war and peace, and to be the guardians of the public faith.

FECULA, or FÆCULA, in pharmacy. See the article FÆCULA.

FECULENT, or FÆCULENT. See the article FÆCULENT.

FECUNDITY, or FOECUNDITY, the ſame with fertility. See the article FERTILITY.

FEE, in law, ſignifies a certain allowance to phyſicians, barriſters, attornies, and other officers, as a reward for their pains and labour.

FEE alſo denotes a ſettled perquiſite of public officers, payable by thoſe who employ them.

FEE-ESTATE, that held by the benefit of another, and for which ſome ſervice, rent, or acknowledgment is paid to the chief lord, or ſuperior, in whom the mere propriety of the ſoil always continues.

Fee is generally divided into abſolute and conſtitutional. Abſolute, otherwiſe termed fee-ſimple, is where a perſon is ſeized of lands or tenements, to him and his heirs for ever; whereas, fee-tail, or conditional fee, is where a perſon is ſeized of lands, with a limitation to him and the heirs of his body. A fee-ſimple is the largeſt eſtate a perſon can have, and can be conveyed by no other expreſſion, but heirs for ever; yet, in a will, which is more favoured than a grant, the intention of the teſtator is more conſidered than the literal meaning of the words.

FEE-FARM, a kind of tenure without homage, fealty, or other ſervice, except that mentioned in the feoffment; which is uſually the full rent, or at leaſt a fourth part of it.

The nature of this tenure is, that if the rent be behind, and unpaid for two years, then the feoffer and his heirs may have an action for the recovery of the lands.

FEELERS, in natural hiſtory, a name uſed by ſome for the horns of inſects. See the article HORN.

FEELING, TOUCHING, one of the external ſenſes, by which we attain the ideas of ſolid, hard, ſoft, rough, hot, cold, wet, dry, and other tangible qualities.

All matter, of ſufficient conſiſtence or ſolidity to affect the ſurface of our ſkin, becomes the object of feeling. This ſenſe aſcertains the bulk and figure of bodies, their diſtance, inaction, motion, ſolidity, ſoftneſs, fluidity, heat, coldneſs, dryneſs, moiſture, &c. theſe are its proper objects.

The ſenſation of warmth or heat is a ſort of light emotion, or irritation of our nervous parts, and an expanſion of our ſolids and fluids, produced by the ſlight action of a moderate quantity of the ſubtile matter that compoſes fire, or the origin of heat, whether natural or artificial.

When this matter either exceeds in quantity, or is more than ordinarily agitated, then, inſtead of irritating or expanding our ſolids and fluids, it tears and diſſolves them; and this violence of action cauſes an inflammation.

The ſenſation of cold, on the contrary, is a ſort of obſtruction in the nervous papillæ, and generally in all the ſolids, and a condenſation or defect of motion in our fluids, ariſing either from the contact of ſome cold ſubſtance; that is to ſay, of a ſubſtance that is not to any degree impregnated with ſubtile agitated matter, like the air or water; or by any other accidental cauſe, whereby the motion of our fluids, and natural elemental heat, is ſuppreſſed, like the periodical convulſion of the ſolids that produces the ſhivering in an ague. It is probable that our fluids being either totally condenſed, or impeded in their motion, by one or other of theſe cauſes, the nervous papillæ, and the ſolids in general, which are ſolely expanded by the impulſe of theſe fluids, are immediately blocked up; and it is this conſtipation that is the ſource of all the effects of cold in the human body.

The ſkin, the organ of feeling, is a compoſition of fibres, nerves, and veſſels, which are interwoven one with the other in ſuch an extraordinary manner, that the texture, in ſome meaſure, reſembles network. See CUTIS.

This fibrous texture is viſible in thick ſhammy, and in the ſoles of ſhoes made of a thick and ſoft leather, where, indeed, the fibres appear very diſtinctly.

The ſkin adheres to all the parts it incloſes, by means of blood-veſſels, lymphatics, nerves, and ſometimes fleſhy fibres, as in the face; but commonly by ſeveral very thin complicated foliages, which form themſelves into little cells, where the extremities of the arteries ſecrete an oil, termed fat. The anatomiſts call theſe ſtrata of foliages the cellular membrane, or membrana adipoſa.

The ſkin is formed of all the parts themſelves that faſten to the body which it infolds. Theſe foliages, veſſels, and capillary nerves are determined one over the other by the compreſſion of the waters that ſurround the fœtus in the womb, and after its birth by the preſſure of the atmoſphere. Theſe fibres, being thus interwoven and preſſed together, form the ſubſtance we have been deſcribing. Several of theſe veſſels, originally hollow, acquire, in a ſhort ſpace, a firm ſolidity, and become, as it were, tendinous; and are, with the nerves, the principal ſubſtance of this thick texture.

The nervous capillaries, after having concurred, by thin twining and running acroſs one another, to the formation of the ſkin, terminate in its external ſurface, where they ſhed their firſt coat, to wit, that ſupplied by the dura mater. This firſt coat, commonly ſtiled the ſheath of the nerve divided into ſeveral ſhreds, that ſtick entangled together on the ſurface of the ſkin, and by that means conſtitute a ſort of net-work, called the reticulary body.

The mechaniſm of this nervous net-work is very well accommodated for receiving the impreſſion of objects; but the extremity of the nerve, ſtripped of this firſt coat, expands and raiſes itſelf between the interſtices of this net-work, and forms the nervous papillæ. Theſe are elevated above the net-work, are far more ſuſceptible of irritation, and conſequently entirely formed for the production of the moſt perfect ſenſation. A ſpirituous lymph moiſtens theſe papillæ, renders them ſuple and elaſtic, and of courſe furniſhes an organ, in all reſpects complete and accompliſhed.

Theſe papillæ are ranged in lines, and in a certain order: and it is this order that produces the little ridges obſervable on the cuticle or ſcarf-ſkin, and ſo viſible at the ends of our fingers, where they are ſpiral.

The nervous papillæ are perpendicular to the ſurface of the body. At the ends of the fingers they are lengthened in proportion to the extent of that part, and are ſo cloſely connected together, as to form thoſe ſolid bodies, the nails.

Their very ſtraight union is the reaſon why there is no paſſage for the animal fluid through this compoſition, whence the nail becomes inſenſible. But to make amends, at the root of the nail, where the nervous papillæ are very ſolid, very elaſtic, and remain open to the flux of ſpirits, the ſenſation is extreme. The ſanguinary, lymphatic, and oily capillaries, that penetrate the texture of the ſkin, are diſtributed almoſt like the nerves: being interwoven one with another in the ſkin, they form the vaſculary net-work. Their expanſion on the ſurface of the ſkin conſtitutes the excretory veſſels, and the cuticle that inveſts the papillæ, and is very neceſſary to them, by ſoftening the impreſſion of objects, and rendering by that means the perception more diſtinct. In ſhort, to this ſtructure, ſo adapted to forming the organ of feeling, we muſt add the glands ſituated under the ſkin; which ſerve to ſupply, at the end of the lymphatics, the ſpirits neceſſary for the lymph that moiſtens the nervous papillæ, and to beſtow on the animal fluid a preparation requiſite to the perfection of this ſenſation.

FEINT, in muſic, the ſame with dieſis. See the article DIESIS.

FEINT, in fencing, a ſhew of making a thruſt at one part, in order to deceive the enemy, that you may really ſtrike him in another.

A ſimple feint is a mere motion of the wriſt, without ſtirring the foot.

FELAPTON, in logic, one of the ſix moods of the third figure of ſyllogiſms, wherein the firſt propoſition is an univerſal negative, the ſecond an univerſal affirmative, and the third a particular negative.

FELIS, in zoology, is uſed by Linnæus as the name of a large genus of quadrupeds, of the order of the feræ; the characters of which are theſe: the fore-teeth are ſmall, obtuſe, and equal; the tongue is furniſhed with prickles, all pointing backwards; and the feet are formed for climbing, with claws which may be drawn in or extended at the creature's pleaſure.

To this genus belong the lion, tiger, leopard, cat, cat of the mountain, lynx, and ounce.

FELLING *of Timber.*—The ſeaſon when this operation ſhould be performed, many diſagree about; ſome are for having it felled as ſoon as the fruit is ripe, others in the ſpring, but the moſt are for autumn felling. Now, as the ſap and moiſture of timber is certainly the cauſe that it periſheth much ſooner than it otherwiſe would do, it ſeems evident that timber ſhould be felled when there is the leaſt motion of ſap in it, viz. from the time that the leaves begin to fall, till the trees begin to bud. In order to augment the ſtrength and duration of timber, the trees deſigned for felling ſhould previouſly be barked, and ſuffered to ſtand and die, before they are cut; though not to be barked entirely, as M. De Buffon adviſes, but in circles, leaving ſome bark remaining; this method will cauſe a more regular decay, and likewiſe prevent the trees from ſplitting in very hot weather, which they are apt to do if entirely ſtripped. Timber ſhould be felled when of a proper age; for when it is either too young or too old, it will not be ſo durable as when cut at a proper age: it is ſaid, that oak ſhould not be cut under ſixty years old, nor above two hundred; however, timber ſhould be cut in its prime, when almoſt fully grown, and before it begins to decay; this will be ſooner or later, according the dryneſs or moiſture of the ſoil where the timber grows; as alſo according to the ſize of the trees, for there is no fixed rules; experience and judgment muſt be the director in this as in moſt other caſes.

When any tree is to be cut down for timber, the firſt thing to be taken care of is a ſkilful diſbranching ſuch limbs as may endanger in its fall: many trees are utterly ſpoiled for want of a previous care of this kind. In arms of timber that are very great, it is always neceſſary to chop or ſink in them cloſe to the bole, and then, meeting it with down-right ſtrokes, it will be ſevered from the tree without ſplitting. In felling the tree, take care always to cut it as cloſe to the ground as poſſible, unleſs it is intended to be grubbed up; and the doing this is of advantage both to the timber, and to the wood; for timber is never ſo much valued, if it be known to grow out of old ſtocks.

FELLOWSHIP, COMPANY, or PARTNERSHIP, in arithmetic, is a rule of great uſe in ballancing the accounts of ſeveral partners trading in a company, ſo that every partner may have his juſt part of the gain, or ſuſtain his juſt part of the loſs, according to his proportion or ſhare of money he hath in the joint ſtock: this falls under two conſiderations, called the *Single and Double Rule of* FELLOWSHIP.

Single FELLOWSHIP, or FELLOWSHIP *without Time.*—By this rule are adjuſted the accounts of thoſe partners that put all their ſeveral, and perhaps different, ſums of money into a common ſtock at one and the ſame time; and therefore it is uſually called the Rule of Fellowſhip without Time: queſtions of this nature are anſwered by ſo many ſeveral operations in the Rule of Three direct, as there are partners in the ſtock.

Example 1. Suppoſe three partners, A, B, and C, make a joint ſtock of 192 *l.* in this manner: A puts in 48 *l.* B puts in 64 *l.* and C puts in 80 *l.* with this 192 *l.* they trade, and gain 24 *l.* it is required to find each man's true part of that gain?

Here it will be, as the ſum of the ſtocks 192 *l.* is to the total gain 24 *l.* ſo is each man's particular ſtock to his reſpective ſhare of the total gain: wherefore in this caſe, A's ſhare of the gain will be 6 *l.* B's 8 *l.* and C's 10 *l.*

Proof. 6 *l.* + 8 *l.* + 10 *l.* = 24 *l.* the whole gain.

That is, if the ſum of each man's particular gain amount to the whole gain, the work is true; if not, ſome error is committed, which muſt be found out.

Example 2. Three merchants, A, B, and C, freight a ſhip with 248 tuns of wine; A loaded 98 tuns; B 86 tuns; and C 64 tuns. By extremity of weather, the ſeamen were forced to caſt or throw 93 tuns of it overboard; how much of this loſs muſt each merchant ſuſtain?

98 36,75 for A's loſs.
As 248 is to 93 ſo is 86 to 32,25 for B's loſs.
64 24,00 for C's loſs.

Proof — — — 93,00 = to the whole loſs.

Now, if the queſtion were, to find how much of the remaining wine that was ſaved belongs to A, to B, and to C?

Then 98—36,75=61,25 belongs to A.
And 86—32,25=53,75 belongs to B.
And 64—24, =40 belongs to C.

That is, A ought to have 61 tuns and 63 gallons; B ought to have 53 tuns and 189 gallons; and C ought to have 40 tuns of what was left.

Double FELLOWSHIP, or FELLOWSHIP *with Time.*—This is uſually called the Double Rule of Fellowſhip, becauſe any particular man's money is to be conſidered, with relation to the time of its continuance in the joint ſtock.

Example 1. A and B join in partnerſhip upon theſe terms, viz. A agrees to lay down 100 *l.* and to employ it in trade three months; then B is to lay down his 100 *l.* and with the whole ſtock of 200 *l.* they are to trade three months more. Now, at the end of this time, they find their whole gain to be 21 *l.* It is required to know what each man's part of the gain ought to be, according to his ſtock, and and the time of employing it?

Here it is but reaſonable to conclude, that as the ſum laid down by each perſon is the ſame, their reſpective gains ſhould be in the proportion of the times thoſe equal ſums were employed; conſequently as 9, the ſum of the times, is 3 B's time, ſo is the whole gain 21 *l.* to 7 *l.* B's ſhare of the gain, which taken from 21 *l.* leaves 14 *l.* for the ſhare of A.

If in the above example the times had been equal, but the ſums laid down unequal, it is evident the whole gain in that caſe muſt have been divided between the partners in the ratio of the ſums adventured; whence its follows, that when the ſtocks and times of continuance are reſpectively unequal, the total gain muſt be divided in the ratio compounded of each man's money and time reſpectively. Therefore, in order to reſolve all queſtions of this nature, be the partners never ſo many, obſerve this rule.

Multiply every particular man's ſtock with the time it is employed; then it will be as the ſum of all theſe products is to the whole gain or loſs, ſo is every one of theſe products to its proportional part of that whole gain or loſs.

Example 2. Three merchants, A, B, and C, enter into partnerſhip, thus: A puts into the ſtock 65 *l.* for eight months, B puts in 78 *l.* for twelve months, and C puts in 84 *l.* for ſix months; with theſe they traffic and gain 166 *l.* 12 *s.* It is required to find each man's ſhare of the gain proportionable to his ſtock and time of employing it?

1. A's ſtock 65 *l.* × 8 months, the time it was employed = — — — } 520
2. B's ſtock 78 *l.* × 12 months, the time it was employed = — — — } 936
3. C's ſtock 84 *l.* × 6 months, the time it was employed = — — — } 504
The ſum of theſe products — — — 1960

Then, according to the rule, the ſeveral proportions will ſtand thus:

	£.	s.	d.	
1960 : 166,6 : : 520 : 44,2 =	44	4	0	for A.
1960 : 166,6 : : 936 : 79,56 =	79	11	$2\frac{1}{2}$	for B:
1960 : 166,6 : : 504 : 42,84 =	42	16	$9\frac{1}{2}$	for C.
The whole gain — —	166	12	0	

Or you may work by firſt finding the proportional part of the gain due to one pound, which will ſerve for a common multiplier.

Thus 1960 : 166,6 : : 1 : 0,085, the ſaid common multiplier.

Then 520 × 0,085 = 44,2 for A,
And 936 × 0,085 = 79,56 for B,
Alſo 504 × 0,085 = 42,84 for C, } as before.

FELLWORT, gentiana, in botany. See GENTIANA.

FELO DE SE, in law, a perſon that deliberately lays violent hands on himſelf, and is the occaſion of his untimely death, whether by hanging, drowning, ſtabbing, ſhooting, or any other way.

FELON, in law, a perſon guilty of felony.

FELON-WORT, in botany, the ſame with the ſolanum, or deadly night-ſhade.

FELONY, in law, a capital crime, next in degree to petit treaſon, and committed with evil intention; as murder, theft, ſodomy, rape, ſetting fire to houſes wilfully, &c.

FELT, in commerce, a kind of ſtuff compoſed either of wool alone, or of a mixture of wool and hair, but neither ſpun nor wove, deriving all its conſiſtence from being fulled or wrought, with lees and ſize.

FEMALE, a term peculiar to animals, and ſignifies that ſex which conceives and generates its young within itſelf.

The word is alſo applied, in a figurative ſenſe, to inanimate objects, from the reſemblance they bear to the female of animals: thus we ſay, a female ſcrew, a female flower, &c. See Screw, Flower, &c.

FEMME Covert, in law, a married woman. See Coverture.

Femme Sole, an unmarried woman, whoſe debts, contracted before marriage, become thoſe of her huſband after that ceremony has been performed.

FEMININE, in grammar, is that gender which denotes a female.

FEMUS, the thigh, in anatomy, is that part of the body intercepted between the buttocks and the knee. See the article Thigh.

FEN, a general name for boggy or marſhy land, commonly overflowed with water.

In draining theſe ſort of lands, which is the only method of making them uſeful, trenches and drains for carrying off the water muſt be formed, in order to render the ſurface dry, and of a proper conſiſtence for producing vegetables.

This may be attempted by various methods; but whatever mode of proceeding be adapted, the loweſt part of the ground is to be ſound out firſt, and the overflowing from great rains, and from land floods, muſt be provided for, in the carrying off that way; for, ſhould this be neglected, all the labour and coſt employed on the other principle would be thrown away. If it is found that this can be done, there muſt be afterwards cut a large drain through the middle of the land, and ſeveral ſmaller drains communicating with this.

The great drain muſt be dug deep enough to drain the whole level; and this, and all the others, muſt be made the narroweſt at the head, and wider all the way to the mouth, where it muſt be wideſt of all.

Theſe drains muſt be all well cleanſed from mud and weeds every ſpring and autumn, and the water from land-floods muſt be kept from coming in upon theſe lands, as much as poſſible, that there may be the leſs to be drained off; the lower edges of the fen land muſt be for this purpoſe guarded with banks to turn the water into other channels. In Eſſex, they have many lands that lie below the high-water mark, and are above the low-water mark, and have land-floods or fleets running through them, which make a ſort of ſmall creek. Theſe lands they have a very eaſy way of draining, though they are naturally very moiſt, when they firſt incloſe them from the ſea; they do it with a bank, which they extend from one ſide of the land they deſign to take in, to the other, excepting a ſpace that they leave, where the creek or land-floods run into the ſea. They then prepare a wooden frame well planked, and of a conſiderable thickneſs, fitted to the head of the creek, and capable of ſhutting it wholly up; in this frame they make ſeveral holes, in which are placed wooden troughs, made each of four boards, and ſuited in ſize and number to the quantity of water that is to be diſcharged through them from the land floods. Each of theſe trunks is open towards the creek, but on the ſea-ſide it has a door or flap, which opens when the land-flood preſſes againſt it, and gives it free paſſage out; but, when the ſea-water is riſen to the height of it and preſſes it, it is ſhut by the force, and no ſea water is let in. When this head is prepared, they let it in, and, ſtopping up the whole creek, they continue the banks on each ſide till they meet it: thus all the land-floods are let out at low-water, and not a drop of ſea-water can be admitted, ſo that the lands are kept dry and uſeful, which were before rendered uſeleſs, by being drowned with ſalt-water at every high-water mark. The freſh water of the creek is thus kept unmixed with the ſea-water, and therefore affords good drink for the cattle, which is commonly very difficult to be had in this ſort of lands, the tides ſpoiling what freſh waters there are, every time they come up.

FENCE, in gardening and huſbandry, a hedge, wall, ditch, bank, or other incloſure, made round gardens, fields, woods, &c. The uſual fences about fields are hedges of either white or black thorn, crab, holly, alder, furze, &c. thoſe about parks are generally of oak paling, which is very durable, and ſome are incloſed with walls. The principal fence for gardens are walls, and particularly for kitchen-gardens, as they are not only the beſt ſecurity, but are of great uſe to ripen fruits which are of the tender kinds. See the articles Walls and Exposure. But with reſpect to pleaſure gardens, walls ſhould be avoided wherever they may intercept the proſpect of the diſtant country; but where the objects are diſagreeable, they may be uſed: the moſt proper fence for a pleaſure-garden adjoining to a park, is a foſſe or kind of ditch, faced with an upright wall on the garden-ſide, about five or ſix feet high, with the ground regularly ſloping on the park ſide; by this method the view is continued without interruption, as the garden and park will appear blended in one. Another kind of fence is made by banking up the earth. See the article Earth-Banks. In Devonſhire, and other places where ſtone are plenty, they make their fences with two ſtone walls at a proper diſtance, filling up the ſpace between with earth, to any height or width at pleaſure : on the top not only quickſets are planted, but timber trees thrive very well on them. Beſide the above-mentioned, there are other kind of fences, ſuch as poſts and rails, rope and net fences, reed fences, chevaux de frize to hinder the approach of cattle, &c.

Fence-Month, the month wherein deer begin to fawn, during which it is unlawful to hunt in the foreſt.

It commences fifteen days before Midſummer, and ends fifteen days after it. This month, by ancient foreſters, is called defence-month. There are alſo fence-months, or ſeaſons, for fiſh as well as wild beaſts, as appears by Stat. Weſt. 13 Geo. II.

FENCING, the art of making a proper uſe of the ſword, as well for attacking an enemy, as for defending one's ſelf.

FENDERS, among ſailors, certain pieces of rope, wood, faggots, or other materials, hung over the ſide of a ſhip or boat, to prevent them from ſtriking or rubbing againſt each other, when they lie cloſe together; alſo to prevent ſhips, boats, and other veſſels from bearing againſt a wharf or key.

FENDUE *en Pal*, in heraldry, a croſs clove down in pale, that is, from top to bottom, and the two parts ſet at ſome diſtance from each other.

FENESTRA, in anatomy, a term applied to two openings or foramina within the ear, diſtinguiſhed by the names of the oval and the round feneſtra.

FENNEL, *fœniculum*, in botany, an umbelliferous plant, whoſe root is white, ſtrait, of a ſweetiſh aromatic taſte, and perennial; the ſtalk is annual, ſtrait, round, jointed, ſmooth, ſlender, and covered with a greeniſh rind; it is full of a ſpungy white pith, and divided into many wings towards the top; the leaves are of a dark green, and divided into long capillary ſegments, with a ſweet pungent taſte and ſmell, the flowers grow in umbels at the ends of the branches, in July, and are roſaceous, conſiſting of five yellow incurved pedals; the ſeeds are oblong, thick, and channeled, gibbous on one ſide and plane on the other. The leaves, roots, and ſeeds, are uſed in medicine; the root being one of the five opening roots, and the ſeed one of the greater carminative ſeeds.

Sweet Fennel differs but little from the former only the ſtalk is not ſo high nor ſo thick, and the leaves are leſs, but the ſeeds are longer, narrower, ſtreaked and whitiſh, of a more ſweet and aromatic taſte, with nothing of the pungency of the other ſort; ſweet fennel ſeed is accounted carminative and attenuant, conſiderably diuretic and ſudorific, and is recommended as a ſpecific in the meaſles, ſmall-pox, and malignant fevers. The roots of fennel have exactly the ſame ſmell and taſte of the celebrated gingſeng of the Chineſe; and, according to Boerhaave's opinion, it may be a very good ſubſtitute.—In the Linnæan ſyſtem of botany, fennel is claſſed with the anethum, which ſee.

FENUGREEK, in botany. See the article Foenugreek.

FEOFFMENT, in law, is a gift or grant of any manors, meſſuages, lands, or tenements, to another in fee, that is, to him and his heirs for ever, by delivery of ſeiſin, and poſſeſſion of the eſtate granted.

FERALIA, in antiquity, a feſtival obſerved among the Romans, on the twenty-firſt of February; or, according to Ovid, on the ſeventeenth of that month, in honour of the manes of their deceaſed friends and relations.

FER De Fourchette, in heraldry, a croſs, having at each end a forked iron, like that formerly uſed by ſoldiers to reſt their muſkets on. It differs from the croſs fourche, the ends of which turn forked, whereas this has that ſort of fork fixed upon the ſquare end.

Fer De Moulin, *Milrinde*, *Inke de Moulin*, in heraldry, is a bearing ſuppoſed to repreſent the iron-ink or ink of a mill, which ſuſtains the moving mill-ſtone.

FERIÆ, in Roman antiquity, holidays, or days upon which they abſtain from work.

FERIAL Days, according to the Statute 27 Hen. VI. cap. v. are taken for all days of the week except Sunday.

FERMENT, any body which, being applied to another, produces fermentation.

Ferments are either matters already in the act of fermentation, or that ſoon run into this act. Of the firſt kind are the flowers of wine, yeaſt, fermenting beer, or fermenting wine, &c. and of the ſecond are the new expreſſed vegetable juices of ſummer fruits.

Among diſtillers, ferments are all thoſe bodies which, when added to the liquor, only correct ſome fault therein, and by removing ſome obſtacle to fermentation, forward it by ſecondary means; as alſo ſuch as being added in time of fermentation, make the liquor yield a larger proportion of ſpirit, and give it a finer flavour. See the article Addition.

FERMENTATION, the inteſtine motion excited in vegetables, by which they are changed in ſuch a manner, that the firſt thing that riſes from them in diſtillation is acrid, mixible with water, of a warm aromatic taſte, inflammable like oil, thin and volatile ; or elſe acid, that will extinguiſh fire and flame, and is leſs thin and volatile

The word is Latin, *fermentatio*, and derived from *fermentum*, leaven.

A certain degree of warmth ſeems requiſite, in the northern climates, to all artificial liquors intended for immediate fermentation, eſpecially in the winter: but the natural juices of vegetables that have never been inſpiſſitated, as that of grapes, and other fruits, when fully ripened, will uſually ferment as ſoon as they are expreſſed, without any external aſſiſtance. But as a certain degree of inſpiſſation prevents all tendency to fermentation in vegetable juices, otherwiſe ſtrongly diſpoſed to ferment, ſo a long continuance or increaſe of the inſpiſſating heat, eſpecially if it acts immediately, through a metaline or ſolid body, upon the juice, will deſtroy its fermenting property; and this the more effectually, as the heat employed approaches to that of ſcorching, or the degree capable of giving an empyreuma. After the ſame manner, ſeveral experiments make it appear, that there is a certain degree of heat, the continuance, or at leaſt increaſe whereof, proves detrimental, or deſtructive to fermentation, as there is another that wonderfully encourages and promotes it. Theſe two degrees of heat ought to be carefully noted and ſettled by the thermometer, or other more certain method, for philoſophical and chemical uſes; but for common or œconomical occaſions, they may be limited to what we uſually underſtand by a tepid and a fervid heat: a fervid heat is the bane of all vinous fermentation; as a tepid one, or rather an imperceptible warmth, is the great promoter thereof. In this neutral ſtate therefore, with proper contrivances to preſerve and continue it, the liquor is to be put into a ſuitable veſſel for fermentation; at which time, if it work not of itſelf, it muſt be quickened by additions; and, in general, by ſuch things as are properly called ferments. See FERMENT.

When thus the proper quantity of a good-conditioned and ſuitable ferment is got ready, it muſt be put to the fermentable liquor in the bare tepid, or ſcarce luke-warm ſtate above-mentioned. The beſt manner of bringing them together, for raiſing the fermentation quick and ſtrong, ſeems to be this: when the ferment is ſolid, it ſhould be broke into ſmall pieces, and gently thinned, with the hand, or otherwiſe, in a little of the luke-warm liquor: but a complete uniform ſolution ſhould not be here endeavoured, becauſe this would, in ſome meaſure, weaken the power of the ferment, or deſtroy its future efficacy. The whole intended quantity therefore, being thus looſely mixed with a moderate quantity of the liquor, ſhould be kept in a tepid ſtate, free from the action of the external air; and at proper intervals more of the warm liquor ſhould be added, till the whole quantity is well ſet to work together: and thus, by dividing the buſineſs into parts, it may be much more ſpeedily and effectually performed.

FERMENTED, in general, ſomething that has undergone a fermentation. See the preceding article.

FERN, *filix*, in botany. There are ſeveral kinds of fern in different parts of the world: but we ſhall only mention two ſorts. The male fern (which Linnæus has claſſed with the polypodium: and the female fern or brakes, which he calls pteris.)

The leaf of the male fern is compoſed of ſeveral other leaves, which adhere to a rib in ſuch a manner as to have lobes on both ſides, cut into the depth of the main fibre.

The common female fern, or brakes, has many large leaves divided into ſeveral branches, beſet with long, narrow, ſtiff pinnulæ, which are moſtly ſmooth about the edges, though ſometimes they are a little indented: the back of theſe, about Midſummer, will be covered round the margins with a great number of duſky brown particles, which are the ſeeds.

The ſeeds of the ſeveral ſpecies of fern were wholly unknown to the ancients. Swammerdam, in his Biblia Naturæ, claims to himſelf the honour of having firſt diſcovered them; but it appears from Hook's works, that Dr. William Cole ſent an account of the ſeeds of ſeveral of the plants of this kind to that author, in 1669; whereas Swammerdam declares his diſcovery of them to have been in 1673; ſo that it is plain that Dr. Cole's was prior to his by ſome years. Swammerdam is an author of that ſtrict probity, that there is no room to doubt but that he ſpoke what he thought to be true; and it is even poſſible that he might have diſcovered them ſooner than the time he mentions; but, however that be, it appears from the later obſervations of the ingenious Dr. Miles, that his accounts are extremely accurate and juſt. The ſeed-veſſels of the common fern, the Engliſh and foreign maiden-hairs, the wall-rue, hart's-tongue, and the like plants, are all alike in their general form, their only differences being in the ſize, and their arrangement on the plants. The number or quantity of the ſeeds is very different in different plants; but Dr. Miles obſerves, that, the fewer ſeeds there are in any ſpecies, there is always the more in quantity of a ſort of ſpongy or fungous matter, which forms a kind of tubercle, not unaptly reſembling what is called Jew's-ears, which ſeems a ſubſtance intended for the ſheltering the ſeeds.

Theſe ſeed-veſſels conſiſt of a ſtalk, by which they are inſerted into the leaf; this repreſents an elaſtic cord, and is ſurrounded by a great number of annular ribs, reſembling the cartilages of the aſpera arteria; and indeed nothing in nature ſo exactly reſembles this cord or ſtalk, as the wind-pipe of a ſmall bird. This cord incircles the globular membranous pod, wherein the ſeeds lie, adhering to it, and dividing it into two hemiſpheres.

The pod is compoſed of a fine whitiſh membrane, ſomewhat like that which lines the inſide of a pea-ſhell; the ſeeds are irregular in ſhape, and of a reticulated ſurface. The moſt advantageous way of viewing this is to uſe the common microſcope, for opake objects, putting on a ſmall magnifier, and laying the ſeeds with their capſules, &c. as taken from the back of the plant, on a piece of poliſhed ivory. The proper time of the year is in the beginning of September; and then, if the plant be newly gathered, the ſeed-veſſels often burſt, while they are under inſpection, and ſhew a very elegant appearance. The manner of this burſting of the pod, which is the method nature has taken for the ſcattering and diſperſing of the ſeed, is this: the cord becomes extended in ſome one part, and ſoon after breaks aſunder; this by expanding breaks the pod into two parts, and, continuing to expand itſelf, as it departs from the curve, and approaches to a right line, it rends itſelf away from the globular pod, till it be at length wholly diſengaged from it; and then, as there can be no farther reſiſtance given to its expanding, it ſuddenly flies off, with a ſort of jerk, and becomes quite ſtraight at once. By this laſt action the capſules are ſhook, and the ſeeds are diſcharged out of them on the plate of ivory, in the ſame manner as the grains of wheat or barley would be thrown out of a bowl placed on the table by the ſhaking of the bowl.

FERN *Oil*, in pottery, a name given, by the Engliſh merchants who have been in China, to a ſort of varniſh which the Chineſe uſe in their porcelain manufactories. See CHINA.

FERRET, *Viverra*, in zoology, a quadruped of the muſtela kind.

The head is ſmall and depreſſed; the ſnout ſharp; the eyes look very fierce and red; the ears are ſhort, patulous and erect, they are conſiderably wide, eſpecially towards the baſe; the mouth is large and the teeth are very ſharp; the neck is ſhort; the body is long and thin; the legs are ſhort, and each divided at the foot into five toes, and they are armed with ſharp claws. This animal is very common in England, but a native of America.

FERRETS, in glaſs-making, the iron with which the workman tries the melted metal to ſee if it be fit to work.

It is alſo uſed for thoſe irons which make the ring at the neck of bottles. *Neri's Art of Glaſs.*

FERRETTO, in the glaſs trade, a ſubſtance which ſerves to colour glaſs. This is made by a ſimple calcination of copper, but it ſerves for ſeveral colours. There are two ways of making this; the firſt is this: take thin plates of copper, and lay them on a layer of powdered brimſtone, in the bottom of a crucible; over theſe lay more brimſtone, and over that another layer of the plates, and ſo on alternately, till the pot is full. Cover the pot, lute it well, place it in a wind furnace, and make a ſtrong fire about it for two hours. When it is taken out and cooled, the copper will be found ſo calcined, that it may be crumbled to pieces between the fingers, like a friable earth; it will be of a reddiſh, and in ſome parts a blackiſh colour. This muſt be powdered and ſifted fine for uſe.

The other way is leſs eaſy, but it makes a more valuable ferretto. It is this: make a number of ſtratifications of plates of copper and powdered vitriol alternately in a crucible, which place in the floor of the glaſs furnace, near the eye, and let it ſtand there three days; then take it out, and make a new ſtratification with more freſh vitriol, and calcine it again as before; repeat this operation ſix times, and a moſt valuable ferretto is produced. *Neri's Art of Glaſs.*

FERRUGINOUS, any thing partaking of iron, or that contains particles of that metal. It is particularly applied to certain mineral ſprings, whoſe waters are impregnated with particles of iron, generally called chalybeates.

The word is Latin, *ferrugineus*, and derived from *ferrum*, iron.

FERRUGO RUST, See the article RUST.

FERRUM, IRON. See IRON.

FERTILITY, that quality which denotes a thing fruitful or prolific.

FERRULA, fennel-giant, in botany, a genus of umbelliferous plants, the compound flower of which is uniform, and the particular ones made up of five oblong erect petals with the ſame number of ſtamina; the fruit is of an elliptical compreſſed form, dividing in two parts, each having a plane ſeed of the ſame figure.

FERULÆ, in ſurgery, ſplinters or chips of different matter, as of wood, bark, leather, paper, &c. applied to bones that have been disjointed, when they are ſet again.

FESSE, in heraldry, one of the nine honourable ordinaries, conſiſting of a line drawn directly acroſs the ſhield, from ſide to ſide, and containing the third part of it, between the honour-point and the nombril.

It repreſents a broad girdle or belt of honour, which knights at arms were anciently girded with.

FESSE POINT is the exact center of the eſcutcheon. See the article POINT.

FESSE WAYS, or *In* FESSE, denotes any thing borne after the manner of a feſſe; that is, in a rank acroſs the middle of the ſhield.

Party per FESSE implies a parting acroſs the middle of the ſhield, from ſide to ſide, through the feſſe-point.

FESTI DIES, in Roman antiquity, certain days in the year devoted to the honour of the gods.

FESTINO, in logic, the third mood of the ſecond figure of ſyllogiſm, the firſt propoſition of which is an univerſal negative, the ſecond a particular affirmative, and the third a particular negative, as in the following example:

FES No bad man can be happy,
TI Some rich men are bad men:
NO *Ergo*, Some rich men are not happy.

FESTIVAL, the ſame with feaſt. See the article FEAST.

FESTOON, in architecture and ſculpture; &c. an ornament in form of a garland of flowers, fruits, and leaves, intermixed or twiſted together.

It is in the form of a ſtring or collar, ſomewhat biggeſt in the middle, where it falls down in an arch; being extended by two ends, the extremities of which hang down perpendicularly.

Feſloons are now chiefly uſed in friezes, and other vacant places, which want to be filled up and adorned; being done in imitation of the long cluſters of flowers, which the ancients placed on the doors of their temples and houſes on feſtival occaſions.

FESTUCA, in botany, a genus of graſſes, the flower of which is compoſed of two valves, and terminated by a ſtrait ariſta or awn; the ſeed is ſingle, oblong, very ſharp pointed at each end, and marked with a longitudinal furrow.

FETLOCK, in the menage, a tuſt of hair growing behind the paſtern-joint of many horſes; for thoſe of a low ſize have ſcarce any ſuch tuft.

FEUD, *Feodum*, the ſame with fee. See the article FEE-ESTATE.

FEUDAL, or FEODAL, denotes any thing belonging to a fee. See the article FEE.

FEUDATARY, or FEODATARY, a tenant who formerly held his eſtate by feódal ſervice. See the article VASSAL.

FEVER, FEBRIS, in medicine; a diſeaſe, or rather claſs of diſeaſes, whoſe characteriſtic is a preternatural heat felt through the whole body, or at leaſt the principal parts of it.

All fevers, of what kind ſoever, are attended with a preternatural heat of the blood and humours, which impairs the bodily ſtrength and its vital functions: wherefore nature raiſes all her forces, and engages the diſeaſe as a mortal enemy; and, if ſhe gets the better, drives out the cauſe of the diſorder by ſuch outlets as ſhe is able. This action is by phyſicians called the criſis of the diſeaſe.

As there is no fever cured without ſome conſiderable evacuation, raiſed either by nature or by art, the phyſician ought carefully to obſerve which way nature ſeems to intend the expulſion of the morbid matter, and to aſſiſt her by all poſſible means. Now this expulſion is very frequently made through ſeveral outlets of the body at a time; and an evacuation by one outlet, more or leſs, checks that by another; thus a looſeneſs checks a ſweat, and *viſa verſa:* wherefore it is the phyſicians buſineſs to diſcern what evacuation is moſt likely to be of ſervice, and ſo to promote this, as to give the leaſt interruption poſſible to any other; for any one evacuation is not equally ſuitable to all perſons, both on account of the difference of conſtitution and of diſeaſes; although evacuations through every emunctory are ſometimes neceſſary, as we find by experience in malignant fevers.

But of all ſolutions of the diſeaſe the moſt deſirable is by ſweat; next to that by ſtool and urine; the worſt is by a hæmorrhage, whether it proceeds from the noſe, or from any other part, becauſe it indicates, that the blood is ſo far vitiated, that no proper ſeparation of the humour can be made.

Laſtly, ſome fevers terminate in abſceſſes formed in the glands, which, if they happen in the decline of the diſeaſe, and ſuppurate kindly, are ſalutary: wherefore the ſuppuration is to be forwarded by cataplaſms or plaſters, and ſometimes by cupping on the tumour; and then, if the abſceſs does not break ſpontaneouſly, it ought to be opened with the knife or a cauſtic.

At this time this rule of practice is generally right, not to exhauſt the patient's ſtrength by evacuations of any kind: and yet in ſome caſes there is a neceſſity for drawing a little blood; as when the humours are in great commotion, and the heat exceſſive; for this remedy, prudently adminiſtered, makes the tumour ripen kindly, becauſe nature has always a great abhorrence of a turbulent ſtate.

Continual FEVERS.—There is no diſeaſe to which the uſeful precept, *principiis obſta*, is more applicable than fevers; becauſe in the beginning it is generally eaſy to do good; but when the diſtemper has gained ground, the cure is often attended with difficulty: for a medicine, which early adminiſtered might have prevented the impending danger, frequently fails when the bodily ſtrength is exhauſted by the violence of the diſeaſe. However, a patient who applies late for aſſiſtance, is not to be abandoned to his fate; ſince it is certain, that thoſe diſeaſes, which in old times were aſcribed to the divine wrath, are frequently cured by natural means, even when they appear moſt deſperate: wherefore the phyſician ought to lay it down as an abſolute rule, never to be wanting in his duty.

And firſt, as blood-letting is a moſt excellent remedy in the beginning of all fevers; if it has happened to be neglected for ſome days, let us conſider whether it is ſtill proper to be ordered.

In caſe of intolerable pain in any part of the body, of difficulty of breathing, or a delirium, blood is to be taken away, according to the patient's ſtrength; with the lancet, if he be able to bear it; if too weak, by cupping; but if exceſſively ſo, by leeches: and if this may be done when the diſeaſe has got to the height, it ought, for ſtronger reaſons, to take place in the beginning: and let me obſerve by the way, that leeches are often of vaſt ſervice in a delirium. I have alſo ſometimes found, by experience, that pieces of lambs lungs, applied warm to the head, have carried off the phrenzy, by the exudation of the noxious or ſuperfluous humour.

FEVERS *attended with Eruptions*, the chief of which, after the ſmall-pox, meaſles, and plague, is the miliary fever, than which no fever puts on more various appearances. Puſtules, rough to the touch, break out ſooner or later all over the body; ſometimes red, ſometimes whitiſh, and again both ſorts intermixed; at one time ſmaller, at another larger and more elevated, and of a bad ſmell. Sobbing and anxiety about the heart are very frequent ſymptoms, which are often followed by a delirium and convulſions. The diſeaſe runs into a conſiderable length; and if it happens to end too ſoon, without a ſufficient perfect criſis, it often brings on a bad habit of body. The red pimples are not ſo dangerous as the whitiſh; and the more lively their colour, the ſafer they are. Hence it appears, that this fever is more owing to a defect of the humours, and the animal ſpirits in particular, than to any bad quality of the air; and that it requires different methods of cure, according to its different circumſtances.

But of what kind ſoever the puſtules are, blood is to be drawn in the beginning, if the patient hath ſtrength to bear it; unleſs he be actually in a ſweat, in which caſe blood-letting is either to be omitted, or at leaſt to be put off for a day or two, or to ſome other convenient time.

Now red puſtules bear bleeding much better than the whitiſh: and though in both ſorts bliſters are ſerviceable, yet they are more neceſſary in the latter; and they are to be applied to the neck, head, and all the limbs, at proper diſtance of time. After all, I would adviſe the phyſician always to bear in mind, that the more ſparingly blood has been drawn, the more happily the diſeaſe generally terminates: for when the ſtrength has been exhauſted by evacuations towards the latter end, the eruption ſinks in, and the patient dies.

Nature's endeavours to expel the morbific matter through the ſkin, are to be aſſiſted by moderately cordial medicines. Of this tribe the moſt proper are the bezoardic powder, the compound powder of contrayerva, and the cordial confection; adding nitre in caſe of an inflammation: and this ſalt may be very advantageouſly joined to cordial medicines in almoſt all malignant fevers, at leaſt in the beginning. Toward the decline, warm bathing is ſometimes ſerviceable, in order to bring forth the remains of the puſtules.

But if, either at the height, or on the decline of the fever, the only appearance of an eruption is a vaſt number of pellucid verſicles, ſo ſmall as hardly to be ſeen: it is not ſafe to perſiſt too long in the uſe of internal medicines of this tribe, unleſs the length of the diſtemper has ſo far weakened the patient, as to render even more powerful cordials neceſſary: for ſuch little roughneſſes of the ſkin are not able to bring on a good criſis, but on the contrary, generally denote a difficult and tedious illneſs; wherefore, without diſcontinuing the bliſters, the cauſe of the diſeaſe is to be carried off by other ways, eſpecially through the inteſtine canal by gentle purges of rhubarb, or manna and Glauber's ſalts.

It is to be obſerved, that this diſeaſe is not always terminated by any one ſort of criſis: it has ſometimes one ſort, ſometimes another; and, in ſome caſes, ſeveral ſorts together, as frequently happens in other malignant fevers. Thus, at the ſame time that there are other diſcharges of the morbific matter, a thruſh ſometimes breaks out, and ſpreads all over the mouth and throat. This commonly begins with a hiccup; and if it be whitiſh and very moiſt, and occaſion a plentiful ſpitting, it is ſo far from portending any great danger, that it is a ſign of the diſtemper's ending happily; but if it be of the black kind and dry, and the ſpittle rough and little in quantity, it is a fatal omen, as it indicates the mouth and throat choaked up with ſlimy phlegm. In theſe caſes, it is proper to uſe gargles made of barley-water and ſyrup of mulberries, or ſome ſuch other ſyrup, or the pectoral decoction: for repellents of all kinds are to be carefully avoided.

It may poſſibly ſeem ſtrange to ſome, that Sydenham preſcribes the bark in this fever, and the aphthæ attending it, who ſays, he always found it to anſwer his expectations. But this was not a raſh practice in that ſagacious phyſician; for this fever often intermits when the aphthæ do not appear; but it more frequently ends upon their going off. In both caſes this excellent antidote is of very great ſervice. Sydenham was the firſt, among us, who deſcribed this fever; which, he ſays, took its riſe here in the month of February 1684, after the long ſevere froſt of the preceding winter. Hence it is probable, that it aroſe from the acrimony of the humours, induced by the conſtruction of the fibres of the ſkin from cold, and the conſequent diminution of perſpiration.

The Petechial FEVER.—The petechæ, from which this fever has its name, are broad red ſpots, like the bites of fleas, not riſing above the ſurface of the ſkin. When they are livid or black, they are of very dangerous prognoſtic; becauſe they are really ſo many little gangrenes; and therefore, the more numerous they are, the more their conſequence is to be dreaded.

The common practice of giving hot medicines in the beginning of this diſtemper, in order to raiſe ſweats, is quite wrong. It is much the ſafer way to check the gangrenous diſpoſitions of the humours by the bezoardic powder, or rather the compound powder of contrayerva, with nitre, as is before mentioned; or to aſſiſt nature with the cordial confection diſſolved in ſimple alexetrial water; and alſo to acidulate the patient's drink with dulcified ſpirit of nitre; to repair his ſtrength with Rheniſh wine; and, in fine, a very proper drink will be barley-water with juice of lemons: and all theſe liquours are to be drank plentifully. It will likewiſe be of uſe ſometimes to adminſter ſome doſes of the calx of antimony and bezoardic powder mixed, in order to provoke ſweat; but the calx ſhould not be too much waſhed: yet it is neceſſary to admoniſh, that it is not an uncommon caſe, eſpecially towards the latter end of the diſeaſe, that the patient's weak low ſtate requires warmer cordials; ſuch as Virginia ſnake-root, contrayerva-root, the root of wild-valerian, ſaffron, and the like: and infuſions of theſe in water will be far more convenient than any other powder, eſpecially if they be mixed with a ſmall quantity of diſtilled vinegar.

Intermitting Fever.—That this is not carried off by the Peruvian bark with a proper degree of certainty, without premiſing a vomit or a purge, or both, is not unknown to phyſicians; but to join ſome mild cathartic to this remedy will perhaps appear new in practice: for it is commonly thought, among us, that this medicine has little or no effect, unleſs the patient is coſtive while he takes it: but long experience has taught me, that it is quite neceſſary to add a ſmall quantity of rhubarb to this febrifuge; ſo as to procure two ſtools at leaſt every day: nor have I ever obſerved that this procedure has leſſened its virtue, but rather rendered it more efficacious; for although ſtrong irritating cathartics raiſe ſuch diſturbance in the blood and humours, as make the proper medicines ineffectual; yet moderate purging is attended with this good effect, that the ſtomach better digeſts whatever is taken in, whether medicines or food; whereby their fineſt and moſt wholeſome parts paſs into the maſs of blood.

The occaſion of my contriving this method of giving the bark was this: about five and thirty years ago, intermittent fevers, of a worſe ſort than ordinary, were very rife, and frequently terminated in a bad habit of body, and even in a dropſy; which conſequences, when I had maturely conſidered, I thought that this method might probably guard againſt them; nor was I deceived in my opinion: and the ſucceſs with which it was attended, encouraged me to purſue it, whenever this diſeaſe attacked bodies loaded with groſs humours: but I was well aware of the danger of purging too much; for after having given a drachm or two of rhubarb in this manner, it was my uſual cuſtom to omit the purgative, and continue the uſe of the frebrifuge alone: and, beſides the advantages already recited, I made this obſervation, that when the diſeaſe is carried off by this method, there is always leſs danger of a relapſe.

Now, with regard to this noble medicine, I have this one admonition to give, that it is not proper in any other fevers but thoſe of the intermittent kind: for in continuals it is ſo far from being of ſervice, that it does much miſchief; and it is alſo pernicious in thoſe hectics which are accompanied with ulcers of any kind of the internal parts; though they often have periodical returns, and much reſemble quotidian or tertian intermittents: whence it may not perhaps appear an improbable conjecture, that this medicine operates on the bile alone; for that the bile has a conſiderable ſhare in cauſing intermitting fevers I have not the leaſt doubt.

However, it ſometimes happens that this febrifuge fails in true intermittents; which failure is generally owing to a bad habit of body: wherefore the phyſician ſhould uſe his beſt endeavours to diſcover in what part the fault lies, and it will be commonly found to be in the viſcera and glands of the abdomen: upon this account it will be neceſſary to preſcribe ſome purges, and ſometimes vomits; and in the intermediate days deobſtruents and ſtomachics, the beſt of which are aromatic bitters and preparations of ſteel: and for the ſame reaſon it is, that quartans are of more difficult cure than any other intermittents; for in theſe the blood and humours are inert and exceſſively viſcid; ſo that there are two diſeaſes to be conquered together, the bad habit of body and the fever; which is generally done effectually, by joining Virginia ſnake-root and ſteel with the bark: however, it may not be improper to take notice, that in ſome caſes where the bark did not anſwer, I have taken off intermitting fevers with a powder compoſed of chamomile flowers, myrrh, ſalt of worm-wood, and a little alum.

But there is more danger attending that ſort of intermitting fevers, by the Greeks named ημιτριταιος, that is, ſemitertian. This fever returns every third day, and of forty-eight hours the fit commonly takes up about thirty-ſix, more or leſs; nor does the fever go off entirely, but only remits between the paroxyſms. Hence Galen was right in ſaying, that it was compounded of a continual, quotidian, and an intermitting tertian.

Thus a particular regard is due to this diſeaſe, which ſeems to be cauſed by an inflammation of ſome internal parts, accompanied with obſtructions from bilious humours and too viſcid lymph: wherefore blood is to be drawn once or oftener, according to the patient's ſtrength; and gentle purgatives, ſuch as the diuretic ſalt, manna with Glauber's ſalt, and the like, are to be ordered and repeated at proper diſtances of time; nor ought we to be haſty in giving the bark, for fear it ſhould increaſe the inflammation by adding to the obſtruction of the viſcera, and bring on a hectic. It will be much ſafer, firſt, to order the ſaline draughts, with juice of lemons, ſalt of wormwood, and ſimple cinnamon-water, to be taken frequently.

Epidemic Fevers.—Theſe are cauſed by ſome fault in our ambient air; and that is chiefly owing to the exceſs of heat, cold, drought, or moiſture, or to the unſeaſonable viciſſitudes of theſe qualities.

In Greece and Aſia, where the ſeaſons are generally uniform, and the winds pretty regular for certain but different quarters in the different months of the year, it was eaſy for men of ſagacity to obſerve the changes of the weather, with their good and bad effects:

effects : and on a long uſe of this method of obſervation was built the art of prognoſtic in diſeaſes, wherein Hippocrates, the father of phyſic, firſt excelled.

But in our climates, ſuch is the inconſtancy of the weather, and ſo many are the cauſes that raiſe different and even contrary winds on a ſudden, that it ſeems impoſſible to erect any ſolid ſuperſtructure on that foundation : and accordingly Sydenham, who, in imitation of Hippocrates, attempted to deſcribe the fevers of each reſpective year, and to account for their differences from the differences of the weather and ſeaſons, found at length " That he had made no progreſs in diſcovering the cauſes of epidemical diſeaſes by obſerving the manifeſt qualities of the air ; as having remarked that in different years, which agreed perfectly well in the viſible temperature of the air, the reigning diſeaſes were very different, and ſo on the contrary ; and likewiſe, that there are various conſtitutions of years, which depend not on heat, cold, drought, or moiſture, but on ſome occult and inexplicable alteration in the very bowels of the earth."

Now this matter, in my opinion at leaſt, ſtands thus : that the manifeſt qualities of the air have a conſiderable ſhare in producing epidemic diſeaſes, is a point that admits of no doubt ; but there are other conjunct cauſes which alter the force of thoſe qualities, either by encreaſing or diminiſhing them. Theſe chiefly ſpring from the earth, as Lucretius wiſely ſaid :

——ubi putorem humida nocta eſt,
Intempeſtivis pluviiſque et ſolibus icta.

When ſhe's grown putrid by the rains and ſweats
Such noxious vapours, preſs'd by ſcorching heats.

Now as this terreſtrial putridity is chiefly occaſioned by rotted vegetables, and ſometimes alſo by the dead bodies of animals, and by minerals ; ſo the waters, eſpecially of lakes and moraſſes, which have their plants and animals, in the ſame manner frequently exhale peſtilential vapours, which infect the circumambient air. In this claſs may be ranged, though rarely happening in our climates, inundations, earthquakes, eruptions from mountains, and all other remarkable and uncommon phænomena of nature, which are capable of filling the air we breathe, with particles offenſive to animal life : for theſe affect our bodies, and prepare them for the eaſy reception of diſeaſes.

Slow or hectic FEVERS.—Theſe are owing to ſo many different cauſes, that they may well ſeem not to be the ſame, but different diſeaſes. Of all this tribe, the moſt pernicious are thoſe which ariſe from an ulcer in any particular part of the body, the lungs eſpecially, by the purulent matter mixing with the blood, and diſturbing its natural motion.

Bilious or Choleric FEVER, a ſpecies of acute fever, owing its origin to diſtemperatures of the bile.

The general ſigns of the bilious or choleric fever, are a remarkable anxiety, and frequent complaints about the breaſt, as of a ſtraitneſs and painful heat. A violent heat on the inſide of the mouth, and inſatiable and intolerable thirſt, trembling and convulſive motions of the joints, and violent deliriums. Dryneſs of the mouth and tongue are often ſo terrible in this diſeaſe, that the ſkin cracks with it ; and often the whites of the eyes, ſometimes the whole body becomes yellowiſh. The peculiar and appropriated ſymptoms of a choleric febris, ſtrictly ſo called, are an univerſal languor and debility of the limbs.

A ſevere ſhivering firſt ſeizes the patient, and is ſoon ſucceeded by a very violent heat, and raging pain in the head ; and, after the two firſt days, there uſually are very terrible ſtrainings and reachings to vomit. The matter brought up at theſe times is cauſtic, acrid, and bilious, and inflames and even ulcerates the fauces ; and, if voided upon a ſtone floor, efferveſces violently. If this vomiting abates, there immediately comes on a diarrhæ attended with a teneſmus, occaſioned by the irritation of this ſharp matter in the rectum. Faintings alſo are very frequent in this diſeaſe, eſpecially where the vomitings do not bring up a ſufficient quantity of the offending matter. The peculiar and appropriated ſigns of the cauſes, ſtrictly ſo called, are theſe : a violent and inſatiable thirſt, greater than that in any other fever. The bowels are always bound, and it is but very ſeldom that there is any tendency to vomit. The urine is rediſh and turbid, and, after ſtanding ſome time, depoſits a red ſediment. Often there is a ſenſible pain and ſoreneſs in the præcordia, ſo that the patient cannot bear the leaſt touch upon the breaſt ; and uſually, in the courſe of the diſeaſe, there are faintings and violent convulſions.

Perſons moſt ſubject to this diſeaſe are ſuch as eat largely, and drink heavy and imperfectly fermented liquors after it. The cholerica febris, properly ſo called, is moſt frequent with thoſe of a cholerico-ſanguineous habit, and ſuch as feed on high-ſeaſoned meats, and drink abundance of wine or other ſtrong liquors ; and is often brought on ſuch perſons by their falling into violent paſſions after a full meal. The cauſes peculiarly attack the people of melancholic habits, who are much inclined to paſſion, but ſuppreſs it, and who are naturally coſtive.

Method of cure.—The cure of theſe diſeaſes conſiſts in the mitigating the violent ſharpneſs of the humour, and promoting its evacuation ; and, finally, in abating the burning heat brought on by it. The utmoſt endeavours are firſt to be made to correct and alter the morbific matter. To this purpoſe the ſeveral preparations of nitre, with the teſtaceous powders and mucillaginous ptiſans, with ſmall mixtures of lemon-juice, and frequent draughts of cooling and diluting liquors, are to be given moderately warm. If the coſtiveneſs be too violent, clyſters of broth muſt be injected, with the addition of a little oil and ſalt; and, if neceſſary, ſmall doſes of rhubarb. To quell the febrile heat and emotion of the blood, the miſtura ſimplex may be given with great ſucceſs; and there is often a ſenſible good effect from the application of rags, wetted in camphorated ſpirit of wine, to the pit of the ſtomach. After the morbific matter is evacuated, the reachings to vomit may be allayed by gentle opiates. All hot medicines change the bilious fevers into inflammatory ones, and the common ſudorifics drive the morbific matter into the blood, and uſually bring on almoſt immediate diſcolourings of the ſkin, like thoſe of the jaundice. Bleeding, though performed ever ſo early in the diſeaſe, ſeldom does any good, except only in remarkable plethoric habits.

Colliquative FEVER, is that in which the body is much emaciated and conſumed in a ſhort ſpace of time: the ſolid parts, and the fat itſelf waſte, ſometimes by a diarrœa, ſometimes by ſweat, by urine, or by feveriſh heats alone, without any ſenſible diſcharge. A colliquative fever is obſerved to accompany a cancer of the breaſt, with a diarrœa. See the articles DIARRHOEA, DIABETES, CANCER, &c.

For this diſeaſe, emulſions of almonds, and of the four cold ſeeds, as alſo aſſes, goats, or woman's milk are proper; or cow's milk with the juice of water-creſſes; chicken broth, broth made of river crabs, or wood ſnails bruiſed.

Diary FEVER, the ſame with ephemera. See EPHEMERA.

Gaol or *Camp* FEVER. See GAOL.

Hoſpital FEVER. See HOSPITAL.

Yellow FEVER. See the article *Bilious* FEVER.

FEVERFEW, *matricaria*, in botany, a genus of umbelliferous plants, whoſe flowers are compound and radiated, the hermaphrodite florets, which compoſe a hemiſpherical diſc, are numerous and tubuloſe, and contain each five capillary ſtamina, the female corollulæ, which form the rays, are ligulated, and contain a filiform ſtyle, terminated by two revoluted ſtigmas; the ſeeds are oblong, naked and ſolitary, being contained in the cup, and placed on a convex naked receptacle.

The common feverfew has a white fibrous root, from which iſſues forth the ſtalks, which are round, ſtriated, branching, and full of a ſpungy pith; the leaves are of a light green colour, compoſed of three pair of lobes, which are cut into many ſegments, and terminated by an odd one. It flowers in June, and the ſeeds are ripe in autumn.

The whole plant has a very ſtrong ſmell; it is biennial, and grows wild in hedges and uncultivated places in many parts of England.

The leaves and flowers of feverfew is reckoned excellent in hyſteric and uterine diſorders. It is certainly a very good carminative, diſcuſſes wind, ſtrengthens the ſtomach, and helps digeſtion.

FEUILLANS, an order of bare-footed monks, who obſerve the ſame rules with the Bernardines. See BERNARDINES.

FIAT, in law, a ſhort order or warrant ſigned by a judge, for making out and allowing certain proceſſes.

FIAT JUSTITIA, is where the king, on a petition to him for his warrant, to bring a writ of error in parliament, writes on the top of it, *fiat juſtitia*, "let juſtice be done;" upon which the writ of error is made out.

FIBER, the bever, in zoology, is made, by Linnæus, a ſpecies of caſtor. See the article BEAVER.

FIBRE, in anatomy, a perfectly ſimple body, or at leaſt as ſimple as any thing in the human ſtructure; being fine and ſlender like a thread, and ſerving to form other parts: hence ſome fibres are hard, as the bony ones; and others ſoft, as thoſe deſtined for the formation of all the other parts.

The fibres are divided alſo, according to their ſituation, into ſuch as are ſtraight, oblique, tranſverſe, annular, and ſpiral; being found arranged in all theſe directions in different parts of the body; for an account of which ſee BONE, MUSCLE, NERVE, ARTERY, VEIN, &c.

FIBRE is alſo uſed to denote the ſlender filaments which compoſe other bodies, whether animal, vegetable, or mineral; but more eſpecially the capillary roots of plants. See PLANT, WOOD, &c.

FIBRILLA, a term ſometimes uſed for a very minute or ſlender fibre.

FIBROSE, ſomething conſiſting of fibres, as the roots of plants. See ROOT.

FIBULA, in anatomy, the outer and ſmaller bone of the leg, called alſo perone. It is nearly of a triangular figure, and ſtands parallel to, but diſtant from, the tibia, or inner bone of the leg. Its upper extremity does not reach to the os femoris, but is only joined to the external ſide of the tibia; and its lower extremity, called malleolus externus, concurs in the articulation of the tarſus, which its eminence ſerves to ſtrengthen, by rendering a luxation leſs eaſy. It has no particular motion of its own, but wholly follows that of the tibia.

FIBULÆUS, a muſcle of the leg, more uſually called peronæus. See PERONÆUS.

FICUS, the fig-tree, in botany, a genus of polygamious plants, producing male and female apetalous flowers; the ſtamina are three ſetaceous filaments, topped with twin anthera, and the female flowers have an inflexed ſtyle, terminated by two acuminated reflexed ſtigmas: the fruit is a large fleſhy turbinated recepticle, the interior ſides of which ſupport the flowers, which are incloſed within it, and is properly nothing but a common calyx, or cup of the fructification.

Fig-trees are propagated either by layers or ſuckers; thoſe which are layed from fruitful branches are to be preferred, for thoſe which are raiſed from ſuckers are generally ſpungy, and are not only apt to produce little or no fruit, but being fuller of ſap than the layers, are alſo liable to ſuffer by froſts in this climate. With us fig-trees are generally planted and trained againſt walls, but they will do very well in ſtandards, they may alſo be planted in eſpaliers, where their large leaves will entirely hide diſagreeable objects; and in order to ſecure them from being damaged in ſevere froſts, this is a very convenient form for protecting them with reed pannels, matts, &c. This laſt methed we think the beſt, as they will produce greater quantities of figs than thoſe againſt walls, which frequently come out before the ſeverity of the ſeaſon is over.

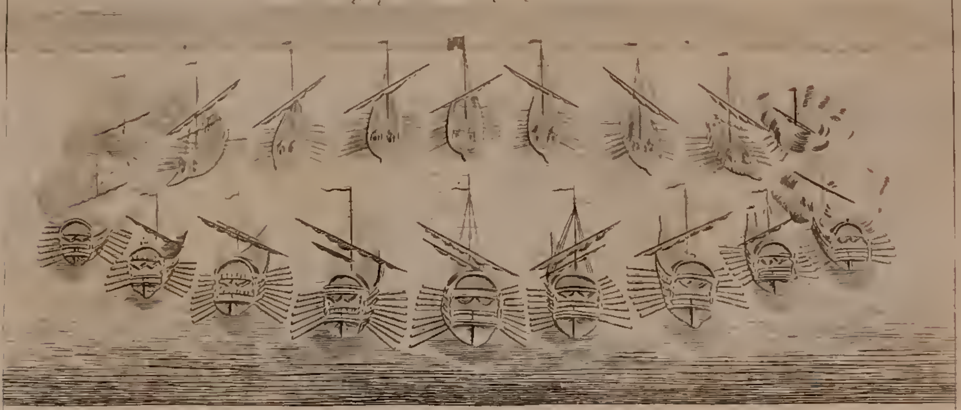
The ſeaſon for pruning fig-trees is either in autumn or the ſpring, we think the month of February the beſt, as at that ſeaſon it is diſcoverable what branches have eſcaped the winter, when they may be pruned accordingly, training them regularly at about a foot aſunder, but they ſhould not be ſhortened, as the fruit is produced at the extremities of the branches; though it is not amiſs, where the branches are luxuriant, to pinch the end off, this will cauſe them to bleed, and may be a means of checking their growth, ſo as to produce branches more fit for bearing.

Fig-trees generally produce two crops in Italy and other warm countries; the firſt crop is little regarded, for it is the ſecond crop of figs that are produced from the ſhoots of the ſame year which is their principal crop; but theſe rarely ripen in England, as it muſt be an extraordinary fine autumn to have them fit to eat in November with us. The inhabitants up the Levant are very curious in the culture of their figs, for, without much pains, their fruit falls off and comes to nought. Tournefort, in his travels, ſays that Pliny obſerved "that in Zia they uſed to dreſs their fig-trees with much care, and ſtill continued to do ſo." To underſtand right this huſbandry of figs (called in Latin *caprificatio*) we are to obſerve, that in moſt of the Archipelago iſlands they have two ſorts of fig-trees to manage, the firſt is called *ornos*, from the old Greek *erinos*, a wild fig-tree, or *caprificus* in Latin; the ſecond is the domeſtic or garden fig-tree; the wild ſort bears three kinds of fruits, fornites, cratitires, and orni, of abſolute neceſſity towards ripening thoſe of the garden fig. The fornites appear in Auguſt, and continue till November without ripening; in theſe breed ſmall worms which turn to a ſort of gnats, no where to be ſeen but about theſe trees; in October and November theſe gnats of themſelves make a puncture into the ſecond fruir, which is called cratitires, and do not ſhew themſelves till towards the end of September; and the fornites gradually fall away after the gnats are gone; the cratitires on the contrary remain on the tree till May, and incloſe the eggs depoſited by the fornites when they pricked them in May. The third ſort of fruit begins to put forth from the ſame wild fig-trees which produced the other two; this is much bigger, and is called orni; when it grows to a certain ſize, and its buds begins to open, it is pricked in that part by the gnats of the cratitires, which are ſtrong enough to go from one fruit to the other to diſcharge their eggs.

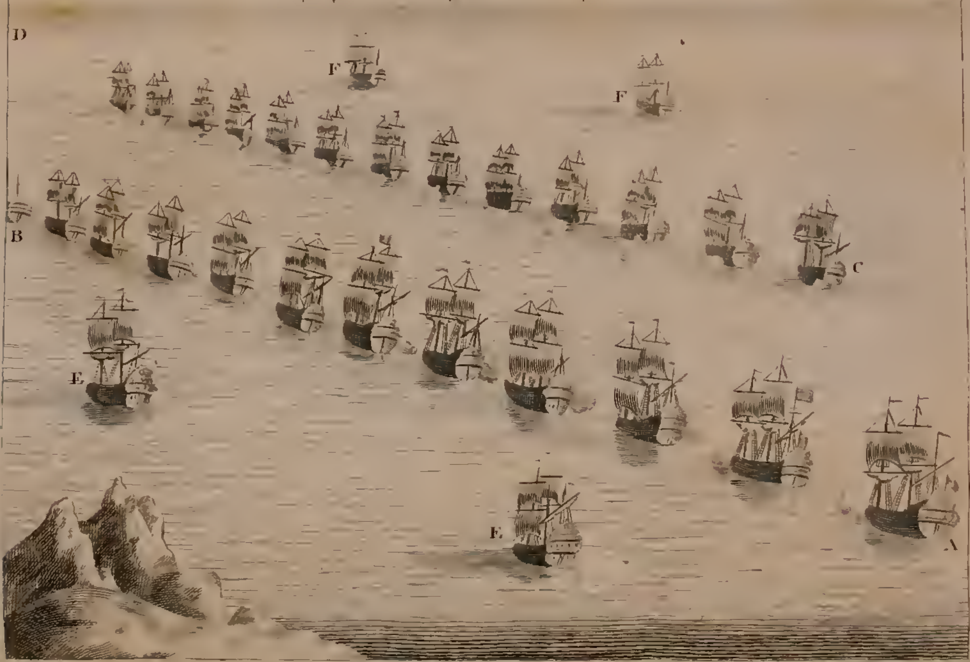
It ſometimes happens that the gnats of the cratitires are ſlow to come forth in certain parts, while the orni in thoſe very parts are diſpoſed to receive them; in which caſe the huſbandman is obliged to look for the cratitires in another part, and fix them at the end of the branches of thoſe fig-trees whoſe orni are in a fit diſpoſition to be pricked by the gnats; if they miſs this opportunity, the orni fall, and the gnats of the cratitires fly away: none but thoſe that are well acquainted with this ſort of culture know the critical minute of doing this; and, in order to it, their eye is conſtantly fixed on the bud of the fig, for that part not only indicates the time that the prickers are to iſſue forth, but alſo when the fig is to be ſucceſsfully pricked; if the bud be too hard and too compact, the gnat cannot lays its eggs, and the figs drop when this bud is too open.

Theſe three ſorts of fruit are not good to eat, their office is to help to ripen the fruit of the garden fig-trees in the following manner: during the months of June and July the peaſants take the orni at a time that their gnats are ready to break out, and carry them to the garden fig-trees; if they miſs the moment, the orni fall, and the fruit of the garden fig-tree not ripening, will in a very little time fall in like manner. To conclude, the peaſants ſo well order the orni, that their gnats cauſe the fruit of the garden fig-tree to ripen in the compaſs of forty days. Tournefort ſays "I could not ſufficiently admire the patience of the Greeks, buſied above two months in carrying theſe prickers from one tree to another; I was ſoon told the reaſon; one of their fig-trees uſually produces between two and three hundred pounds of figs, whereas thoſe of Provence ſeldom above twenty five." Theſe figs are very good green; when they would dry them, they lay them in an oven to keep them the reſt of the year. Barley-bread and dried figs are the principal ſubſiſtence of the boors and monks of the Archipelago; but theſe figs are very far from being ſo good as thoſe dried in Provence, Italy, and Spain. The prickers contribute perhaps to the maturity of the garden fig, by cauſing to extravaſate the nutritious juice, whoſe veſſels they tear aſunder in depoſiting their eggs; perhaps too, beſides their eggs, they leave behind them ſome ſort of liquor proper to fer-

Engagement of Gallies



Engagement of Ships of War



ment gently with the milk of the fig and to make their fleſh tender; for the figs in France ripen much ſooner by having their buds pricked with a ſtraw dipped in olive oil. The particulars of theſe circumſtances are confirmed not only at Zia, Tinos, Mycone, and Scio, but in moſt of the other iſlands of the Archipelago.

FIDD, among ſailors, a piece of wood or iron thruſt through a hole in the foot of the top-maſt, after it is drawn up to its utmoſt height. See Mast and Trussel-Trees.

In the article Cap we obſerved, that it was uſed to keep ſteady the top-maſt above the frame of the top, as it is kept ſteady below by the truſſel-trees: the fidd reſts upon the truſſel trees, and with it of courſe the whole weight of the top-maſt: the fidd-hole is therefore juſt above them when the top-maſts are erect.

FIDDLE-Wood. See the article Citharexylum.

FIDE Jussor, among civilians, the ſame with a ſurety. See Surety.

FIELD, *campus*, in agriculture, a piece of ground incloſed, whether for tillage or paſture. See Tillage and Pasture.

Field, in heraldry, is the whole ſurface of the ſhield, or the continent, ſo called becauſe it containeth thoſe atchievements anciently acquired in the field of battle. It is the ground on which the colours, bearings, metals, furs, charges, &c. are repreſented. Among the modern heralds, field is leſs frequently uſed in blazoning than ſhield or eſcutcheon. See Shield, &c.

Field-Book, in ſurveying, that wherein the angles, ſtations, diſtances, &c. are ſet down. See Surveying.

Field-Colours, in war, are ſmall flags of about a foot and a half ſquare, which are carried along with the quarter-maſter general, for marking out the ground for the ſquadrons and battalions.

Field-Fare, in ornithology, the Engliſh name of the variegated turdus, with a hoary head. See the article Turdus.

It is larger than the common black-bird, and with us is a bird of paſſage, coming over in great numbers in the winter.

Field-Fort, in fortification. See Fort.

Field-Officers, in the art of war. See the article Officer.

Field-Pieces, ſmall cannons, from three to twelve pounders, carried along with an army in the field. See Cannon.

Field-Staff, a weapon carried by the gunners, about the length of a halbert, with a ſpear at the end; having on each ſide, ears ſcrewed on, like the cock of a match-lock, where the gunners ſcrew in lighted matches, when they are upon command; and then the field ſtaffs are ſaid to be armed.

Field-Works, in fortification, are thoſe thrown up by an army in beſieging a fortreſs, or by the beſieged to defend the place. Such are the fortifications of camps, highways, &c.

Elyſian Fields. See Elysian.

FIERI FACIAS, in law, a writ that lies where a perſon has recovered judgment for debt or damages in the king's courts againſt one, by which the ſheriff is commanded to levy the debt and damages on the defendants goods and chattels.

FIFE, in muſic, is a ſort of wind-inſtrument, being a ſmall pipe. See Pipe.

FITFH, in muſic, the ſame with diapente. See the article Diapente.

FIG, the fruit of the ficus or fig-tree. See the article Ficus.

Figs, as well freſh as dry, are very wholeſome food; they are nutritive and emollient: they are alſo good in diſorders of the breaſt and lungs; but a too free uſe of them has ſometimes brought on obſtructions of the viſcera, a common complaint in the Levant. They are frequently made ingredients in our pectoral decoctions, and by ſome are greatly recommended againſt nephritic complaints. They are much uſed externally by way of cataplaſm, either roaſted or boiled in milk, for the ripening of tumours, and for eaſing the pain of the piles.

Fig-Marygold. See Mesemeryanthemum.

Indian Fig. See Opuntia.

Fig, in farriery, a ſort of wart on the fruſh, and ſometimes on the whole body of a horſe. The figs that appear on the fruſh, or ſole, make an evacuation of malignant ſtinking humours, that are very hard to cure.

FIGHT. See Battle.

Sea-Fight implies, in general, an engagement, either between fleets of men of war, fleets of gallies, or ſingle ſhips.

The ancient Greeks, in preparing for an engagement at ſea, made it their firſt buſineſs to diſburthen their ſhips of war of all proviſions, and other lumber not neceſſary in the action, leſt by too heavy a load they ſhould be rendered unweildy, and unfit for ſervice, being neither able with force and vigour to aſſail their enemies, nor by lightly tacking about to avoid their onſets. This done, when the enemy appeared in view, they took down their ſails, lowered their maſts, and ſecured whatever might expoſe them to the winds, chuſing rather to be governed by oars, which they could manage at their pleaſure.

As to their order of battle, that was varied as time, place, and other circumſtances required; being ſometimes formed like an half-moon, and called σολος μηνοειδης, the horns jutting out towards the enemy, and containing the ableſt men and ſhips; ſometimes on the contrary, having its belly neareſt the enemy, and its horns turned backwards, whence it was termed κυρτη παρα αξις: nor was it unuſual to range them in the form of a circle, which they called κυκλον ταττειν; or, to mention no more, in the figure of the letter V, with the horns extended in a direct line, and meeting at the end; which order was named επιχαμπης παραταξις; in Latin, *forceps*; and was uſually encountered by the enemies ranged in the ſame order inverted, whereby they reſembled the figure of a wedge or beak, whence it was called *cuneus* or *roſtrum*; this enabled them to penetrate into the body of the adverſe battle.

Before they joined battle, both parties invoked the gods to their aſſiſtance by prayers and ſacrifices; and the admirals going from ſhip to ſhip in ſome of the lighter veſſels, exhorted their ſoldiers in a ſet oration, to behave themſelves like men: then, all things being in readineſs, the ſignal was given by hanging out of the admiral's galley a gilded ſhield, as we read in Plutarch; or a red garment or banner, which was termed αιρειν σημεια. During the elevation of this the fight continued, and by it depreſſion, or inclination towards the right or left, the reſt of the ſhips were directed in what manner, to attack their enemies, or retreat from them. To this was added the ſound of trumpets, which was begun in the admiral's galley, and continued round the whole navy. It was likewiſe uſual for the ſoldiers, before the fight, to ſing a pæan, or hymn, to Mars; and after the fight, another to Apollo.

The fight was uſually begun by the admiral-galley, as we find done at the battle of Salamis, and another time by Attalus's ſhip: it was carried on in two different manners, for not only the ſhips engaged one another, and by their beaks and prows, and ſometimes their ſterns, endeavour to daſh in pieces, or overſet and ſink their oppoſers, but the ſoldiers alſo annoyed their enemies with darts and ſlings; and upon their nearer approach, with ſwords and ſpears. Thus Lucan:

> *Ut primum roſtris crepuerunt obvia roſtra,*
> *In puppim rediere rates, omiſſaque tela*
> *Æra texerunt vacuumque cadentia pontum.*

> The ſhips firſt meeting ſhew their fierceſt rage,
> And furiouſly with claſhing beaks engage;
> Theſe turn about, and then the javelins fly,
> And ſhow'rs of arrows darken all the ſky;
> The ſea is cover'd o'er.—

We find by the ſame author, that after this firſt onſet, their ſhips approached ſo near each other as to be linked together with chains or grappling-irons, and then they fought with ſword in hand. Sometimes for want of irons they ſo fixed their oars, as thereby to hinder their enemies from retreating; ſo we read in Lucan:

> *Seque tenent remis, toto ſtetit æquore bellum.*

> The ſhips they hold with oars, and all around
> The face of horrid war appears.—

This ſort of combat was not unlike a ſiege, where the ſtronger party, prevailing over their enemies, entered their veſſels by laying bridges between them, and having killed, or taken priſoners, all they found in arms, ſeized and dragged away their ſhips.

When a town was beſieged by ſea, they uſed to environ its walls and harbour with ſhips, ranged in order from one ſide of the ſhore to the other, and ſo cloſely joined together by chains and bridges, on which armed men were placed, that, without breaking their order, there could be no paſſage from the town to the ſea; this leaguer Diodorus calls ζευγμα. The better to prevent any attempts of the beſieged, Demetrius is ſaid to have invented a ſort of boom armed with ſpikes of iron, which ſwam upon the waters; this he placed at the mouth of the harbour of Rhodes, when he beſieged that city. Sometimes they blocked up the harbour, or made a paſſage to the town by raiſing a vaſt mole before it, as we read of Alexander in the ſiege of Tyre; or by ſinking ſhips filled with ſtones and ſand, as we find practiſed by the Romans.

The attacks were uſually carried on by men ſtanding upon bridges between the ſhips, and thence with darts and ſtones forcing the beſieged from their walls: thus Alexander, in the ſiege of Tyre, ſo ordered his gallies, that two of them being joined at the heads, and the ſterns ſomewhat diſtant, boards and planks were laid over in the faſhion of bridges for ſoldiers to ſtand upon, who were in this manner rowed cloſe to the wall, where, without any danger, they threw darts at their enemies, being ſheltered behind the fore-decks of their own gallies. Here, alſo, that they might throw their miſſive weapons with greater advantage, and batter the walls with their rams and other engines, they erected towers ſo high as to command the city walls, from which having repelled the defenders, they by this means had opportunity to deſcend by ladders.

The beſieged were not at a loſs for ways of defeating theſe ſtratagems; the ſhips linked together they pulled aſunder with iron-hooks, the paſſage to the town they blocked up in the ſame manner the enemies had done that of the harbour, or otherways; if they could not hinder their approach, they failed not to gall them with darts, ſtones, fire-balls, melted pitch or metals, and many other things; and, laſtly, to trouble you no farther, it was frequent for thoſe in the town to deſtroy the veſſels and works of the beſiegers by fire-ſhips, as we find done by the Tyrians, who, taking a large veſſel, put a great quantity of ballaſt into the ſtern, covered the head with pitch, tar, and brimſtone, then by the help of ſails and oars brought her cloſe to the Macedonian fortreſs, where having ſet the combuſtible matter on fire, they retreated into boats prepared for that purpoſe; the fire immediately ſeized the towers of the fortification, and by the help of torches and fire-brands caſt by thoſe in the boats, the work itſelf took fire, and the vaſt pile, on which ſo much time and labour had been beſtowed, was in a few moments quite demoliſhed. The uſe of fire-ſhips we likewiſe meet with amongſt the Rhodians in Diodorus the Sicilian.

We have obſerved above that the ancients ranged their ſhips or gallies ſo as to preſent them in front to their enemy; becauſe the machines they then made uſe of, were fixed in the heads or prows of their veſſels: the ſame reaſon now prevails with regard to the gallies, which are drawn up in the form of a creſcent, or half-moon, whoſe ends or horns are oppoſed to the enemy; in the middle of which is the admiral, from whence, he the more diſtinctly obſerves the motions of his fleet throughout. The two fleets being thus drawn up, approach each other to a convenient diſtance, when the battle beginning at the ends of the half-moon, extends inſenſibly till the whole fleet is engaged, and each partake of the danger and glory of the action. See compartment of plate LVI.

In an engagement of ſhips of war, the fleets are drawn up in two parallel lines upon a wind. The ſhips keep cloſe to the wind on the lines they are formed in, and are commonly at a cable's length diſtance one from the other; the fire-ſhips, tranſports, tenders, &c. keeping at half a league diſtance on the oppoſite ſide of the enemy. Thus the fleets A B and C D, that are engaged, are ranged under an eaſy ſail, cloſe to the wind; and the fire-ſhips E E, of the fleet A B, are to windward; the fire-ſhips F F, are to the leeward of the fleet C D. This form was obſerved, for the firſt time, in the famous battle of the Texel, where the duke of York defeated the Dutch, on the 13th of June, 1665. See SQUADRON and LINE.

It is probably the moſt excellent method, as proved by experience, to keep a conſtant fire on the enemy, by firing in platoons, which will have a much greater effect, and diſtreſs them more, than the common received notion of broad-ſide and broad-ſide with ſome intervals between, which is generally the caſe in moſt actions; in order to which, I would divide the guns into five fires, in the following manner, viz half the guns abaft below, then half the guns abaft aloft, ſo the other half below forward; and, laſtly, the quarter-deck guns, and thoſe on the forecaſtle; ſo that, by the time your firſt platoon is fired, you will be able to keep up a conſtant fire on your enemy; which method I prefer, as I obſerved before, to broad-ſide and broad-ſide, where chance has often a greater ſhare in the execution than judgment; notwithſtanding, this laſt method is ſometimes neceſſary, as time and circumſtances may offer. I would likewiſe adviſe you to point your guns ſo as to make a breach in your enemy's ſhip.

The chief judgment of an admiral, is to form his line in a proper diſpoſition and ſtrength from the van throughout to the rear; in doing which, particular regard muſt be had to make the center ſtrong, for if that is forced, or broke through, the battle is looked upon as loſt. Here it is to be obſerved, that, in a ſea-action, the center is made the ſtrongeſt, whereas, in a land-fight, it is the weakeſt; and the wings of an army are ſtrongeſt, leſt the enemy, by forcing a wing, ſhould have the advantage of flanking, and conſequently putting the line in diſorder: for the ſame reaſon alſo the van and rear of a fleet is not put into confuſion, becauſe care is taken to make them proportionably ſtrong to reſiſt the enemy: therefore the weakeſt part of the line will be in the quarters, ſupported each way from the center throughout,

The ſignal being made for battle, each diviſion, every captain crowds into his proper ſtation without loſs of time: they endeavour to approach each other till within point-blank gun-ſhot, which is near enough for a line of battle; for if you ſhould be too near, your line will naturally fall into a curve, notwithſtanding all your endeavours to the contrary; beſides you cannot ſo well obſerve your own line: the enemy may intercept your ſight, eſpecially if the line be long, which may cauſe a miſtake in the ſignals. It would be better for the contending admirals in chief, that each had a view of his own line, as well as of that of the enemy, in order to make proper ſignals, and, if any diſtreſs happen, to be the better able to relieve, or if any advantage, to improve upon it.

The battle being begun the fate of war decides the day. In a word, the ſucceſs of all depends upon placing your ſhot well, and preſerving a proper diſpoſition in the line. There is one maxim, by which we ſhould always be guided, that is, that bravery and reſolution are abſolutely neceſſary in the firſt ſort of engagement, viz. between ſingle ſhips; and conduct and bravery in the ſecond ſort, viz. that between two ſquadrons.

Conduct and preſence of mind are chiefly requiſite in a line of battle; for the admiral cannot be ſuppoſed to want bravery and reſolution. It is then he muſt ſummon up all his knowledge and experience, to judge of the ſtrength of his line; when and how to keep it as compleat as poſſible, by ordering ſhips from the corps-de-reſerve, or by changing ſhips from one part of the line to the other; or by detaching from one part of the wings, which may not be ſo much preſſed, to that which is. Here he muſt alſo conſider the poſition of his enemy; his eye muſt be on him, as well as on his own line, from the van to the rear; and all ſhould ſtrictly mind the admiral's motions, ſignals, &c. Boats will, in all probability, be continually paſſing from the ſhips to their flag-officers, if any thing extraordinary ſhould happen, to acquaint them of it; and from the admirals or commanding officers of each diviſion to the admiral in chief, giving an account of the ſtate and condition of each diviſion; which will be a great ſatiſfaction to him, as he will be then better able to judge how to aſſiſt where moſt wanted if occaſion, or how to improve upon any advantage gained.

The battle drawing to a concluſion, it is eaſy to judge what the conqueror will do to improve his victory; as neceſſary a part of an officer as any in the action, as it requires great judgment and readineſs of thought; and the other, in making his retreat, ſhould let ſlip no opportunity to ſave as many of his fleet as he poſſibly can. His eye muſt be quick, and his judgment and preſence of mind as ready as at the firſt onſet of the battle. He has no other reſource left but in his eſcape, and this comfortable alleviation of his defeat, that a glorious retreat may gain him as much honour as the victory did to the conqueror.

FIGURAL, Figurate, or Figurative, a term applied to whatever is expreſſed by obſcure reſemblances. The word is chiefly applied to the types and myſteries of the Moſaic law; as alſo to any expreſſion which is not taken in its primary and literal ſenſe.

Figural or Figurative Numbers, are ſuch as do or may repreſent ſome geometrical figure in relation to which they are always conſidered, as triangular numbers, pentagonal numbers, pyramidal numbers, &c.

FIGURATIVE, among grammarians, is the ſame with what is otherwiſe called characteriſtic. See Characteristic.

Figurative Counterpoint, in muſic, is that wherein there is a mixture of diſcords along with the concords. See the article Counterpoint.

Figurative Descant, in muſic. See the article Descant.

FIGURE, in philoſophy, the ſurface or terminating extremities of any body.

Figure, in aſtrology, is applied to the deſcription, ſtate, and diſpoſition of the heavens at a certain hour, where the places of the planets and ſtars are marked in a figure of twelve triangles called houſes, with regard to the horoſcope to be drawn from it. They likewiſe call it horoſcope and celeſtial themis.

Figure, in conic ſections, according to Apollinus, is the rectangle of the latus rectum and tranſverſum in the hyperbola and ellipſis. De la Hire calls the rectangle of any diameter and its proper parameter, in the hyperbola and ellipſis, the figure of that diameter.

Figure, in dancing, denotes the ſeveral ſteps which the dancer makes in order and cadence, conſidered as they mark certain figures on the floor.

Figure, in fortification, the plan of any fortified place, or the interior poligon; of this there are two ſorts, regular and irregular; a regular figure is that where the ſides and angles are equal; an irregular is the contrary.

Figure, in geometry, the ſuperficies included between one or more lines, of which there are three ſorts, as rectilineal curvilineal, and mixed figures: rectilineal have their extremities all right-lines, as triangles, quadriliterals, &c. Curvilineal are ſuch as have their extremities crooked, as circles, ellipſes, &c. Mixed, are partly right-lines and partly crooked, as a ſemicircle, ſegment of a circle, &c.

FIGURES, in arithmetic, are certain characters whereby we denote any number, which may be expreſſed by any combination of the nine digits, as 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0.

FIGWORT. See Scrophularia.

FILAMENT, a ſmall fine fibre or thread, which compoſes the texture of the fleſh, nerves, ſkin, &c. of an animal: and it is likewiſe applied to the component parts of vegetables; as alſo to the fibres belonging to their roots. It is alſo uſed to ſignify that viſcid concreted matter, which appears like hairs or threads in urine.

The word is Latin, *filamentum*, which is a diminutive of *filum*, a thread.

Filament, among botaniſts; that part of the ſtamina which ſupports the antheræ and connects it with the flowers, and is of different forms and proportions, according to what claſs the flower belongs to. See the article Stamina

FILAZER, or Filacer, an officer of the Common Pleas, ſo called from his filing thoſe writs whereon he makes out proceſs.

FILBERT, or Filberd, the fruit of the corylus, or hazel. This ſpecies of nuts is more nouriſhing than the common ones; but is hard to digeſt. They are however worthy of being propagated in orchards and gardens; which is done by planting them in February.

FILE, among mechanics, a tool uſed by workmen in metal, &c. in order to ſmooth, poliſh, or cut. It is uſed, in pharmacy, to reduce hard ſubſtances to fine particles, whoſe conſiſtence will not admit of powdering.

File, or Label, in heraldry, conſiſts ſometimes of more, and ſometimes of fewer points. According to Guillim; it is borne as a charge in a coat of arms: but it is uſually the difference or mark of diſtinction which the elder brother bears in his coat during his father's life-time. Some call the file the upper horizontal line, and the label the point that iſſues from it.

File, in the art of war, a row of ſoldiers, ſtanding one behind another, which is the depth of the battalion or ſquadron. The files of a battalion of foot are generally three deep; as are ſometimes thoſe of a ſquadron of horſe. The files muſt be ſtraight, and parallel one to another.

FILIGRANE, or FILIGREE-WORK, any piece of gold or ſilver-work that is curiouſly done, with grains or drops on the filaments or threads.

FILING, in ſmithery, the operation of faſhioning metalline bodies by means of a file. See FILE.

FILIPENDULA, dropwort, in botany, a genus of plants, whoſe characters are the following.

The root is fibrous and perennial, with glandulous bulbs faſtened to it: the leaves are finely jagged like thoſe of millefoil: the calyx is monophyllous, denticulated, and divided into ſix or ſeven ſegments which are retroflected, or bent backwards: the flowers are hexapetalous or heptapetalous, looſely diſpoſed in panicles or long ſtalks, which are almoſt naked: the ſtamina are numerous, and ſituated on the reflected margin of the calyx: the fruit is generally round, and contains many ſeeds compacted together, each of them furniſhed with its tube.

This plant contains a ſalt, approaching to that of alum; but it is mixed with a great deal of ſulphur. All authors agree that it is very diuretic and aperitive; and is alſo recommended for the epilepſy and dyſentry.

FILIX, in botany, an order of the cryptogamia claſs of plants, comprehending the fern, horſe-tail, adder's tongue, maiden-hair, ſpleenwort, polypody, &c. See the articles FERN, HORSE-TAIL, &c.

FILLER-HORSE, one yoked immediately to a cart. See the article CART.

FILLET, in heraldry, the fourth part of the ordinary called a chief, which is placed in the chief point of the eſcutcheon.

FILLET, in painting, gilding, &c. is a little rule or reglet of leaf-gold, drawn over ſome mouldings; or on the edges of frames, &c. eſpecially when painted white by way of ornament

FILLET, in anatomy, the nervous ligament under the tongue, which midwives uſually divide with their nail, or a ſixpence, immediately after the child's birth: it is moſt commonly called the frænum.

FILLET, or FILET, in architecture, a little ſquare member, or moulding, uſed in divers places and on divers occaſions; but generally as a crowning over a greater moulding. It is called liſta or liſtella by the Italians: by the French, reglet; and by others, band and bandelette.

FILLET, in the menage, the loins of an horſe, which begin at the place where the hinder part of the ſaddle reſts.

FILLING *the Sails*, in the ſea-language, the act of diſpoſing a ſail in ſuch a manner, that the wind preſſing into the cavity or belly of it ſhall force the ſhip forward, or a-head, in contradiſtinction to backing, which forces her a-ſtern; and ſhivering, which makes her remain almoſt in a ſtate of reſt, neither advancing nor retreating. It may appear ſomething remarkable, but it is certainly true, that a ſhip may be forced backward or forward, or may remain in her place, with any wind, while her ſtern is all the while directed to one part of the horizon; and theſe different ſtates of motion or reſt may be communicated by backing, filling, or ſhivering the ſails, by drawing the braces on one ſide, and looſening them on the other. See the article BRACE, BACKING, and SHIVERING.

FILLY, a term among the horſe-dealers, to denote the female or the male colt. See the article FOAL.

FILM, in botany, that woody ſkin that ſeparates the ſeeds in the pods of plants.

FILTER, or FILTRE, in chemiſtry, a ſtrainer, commonly made of bibulous or filtring paper, in the form of a funnel, through which any fluid is paſſed, in order to ſeparate the groſs particles from it, and render it limpid. This filtre is put into a funnel, with the ſmall end in the veſſel for the reception of the filtrated liquor, and then the liquor is poured into the paper, not too much at once, for fear of burſting it. A filtre is alſo made of a woolen bag, called Hippocrates's ſleeve, or one of linen, according to the nature of the liquor to be filtred.

FILTRATION, in chemiſtry. See DEPURATION.

FIMBRIÆ, denotes appendages diſpoſed by way of fringe round the border of any thing: ſuch are thoſe about the thicker extremities of the Fallopian tubes. See GENERATION.

FIMBRIATED, in heraldry, an ordinary with a narrow border or hem of another tincture.

This, in Latin, is called *fimbriatus*; that is, edged or fringed.

FIN, *Pinna*, in natural hiſtory, a well known part of fiſhes, conſiſting of a membrane ſupported by rays, or little bony or cartilagious oſſicles.

FINANCES, in the French polity, ſignify the revenues of the king and ſtate.

FINE, in law, hath divers applications: ſometimes it is uſed for a formal conveyance of lands or tenements, or of any thing inheritable, being *in eſſe tempore finis*, in order to cut off all controverſies. Others define it to be a final agreement between perſons concerning any lands or rents, &c. of which any ſuit or writ is depending between them in any court.

FINE ſometimes ſignifies a ſum of money paid for entering lands or tenements lett by leaſe; and ſometimes a pecuniary mulct for an offence committed againſt the king and his laws, or againſt the lord of the manor.

FINE *adnullando levato de tenemento quod fuit de antiquo dominico*, is a writ to the juſtices for diſannulling a fine levied of lands holden in ancient demeſne to the prejudice of the lord.

FINE *capiendo pro terris*, *&c.* a writ lying for one that, upon conviction by the jury, having his lands and goods taken into the king's hands, and his body committed to priſon, obtains favour for a ſum of money, &c. to be remitted his impriſonment, and his lands and goods to be redelivered to him.

Fine *Force*, an abſolute neceſſity that is unavoidable, whereby one is compelled to do any thing.

Fine *levando de tenementis tentis de rege in capite, &c.* a writ directed to the juſtices of the Common-Pleas, to licenſe them to admit of a fine for ſale of lands holden in capite.

Fine *non capiendo pro pulchre placitando*, a writ to inhibit officers of courts to take fines for fair pleading.

Fine *pro rediſſeiſina capienda, &c.* a writ that lies for the releaſe of one laid in priſon for a reſeiſin, upon a reaſonable fine.

Fine *for alienation*, a reaſonable fine paid the king by his tenants in chief, for licenſe to alienate their lands.

FINERS *of Gold and Silver*, are thoſe who ſeparate theſe metals from coarſer ores. See the article Refiners.

FINERY, in the iron-works, one of the forges at which the iron is hammered and faſhioned into what they call a bloom, or ſquare bar. See the article Iron.

FINE-Stiller, in the diſtillery, that branch of the art which is employed on the diſtilling the ſpirit from treacle or other preparations or recrements of ſugar, is called fine-ſtilling, by way of diſtinction from malt-ſtilling; and the perſon who exerciſes this part of the trade is called a fine-ſtiller.

The operation in procuring the ſpirit from ſugar is the ſame with that uſed in making the malt ſpirit; a waſh of the ſaccharine matter being made with water from treacle, &c. and fermented with yeaſt. It is uſual to add, in this caſe, however, a conſiderable quantity of malt, and ſometimes powdered jalap, to the fermenting backs. The malt accelerates the fermentation, and makes the ſpirit come out the cheaper; and jalap prevents any muſty head on the ſurface of the fermenting liquor, ſo as to leave a greater opportunity for the free acceſs of the air, and thus to ſhorten the work, by turning the foamy into a hiſſing fermentation. *Shaw's Lect.*

FINGERS, in anatomy. See Hand.

FINING *of Wine*. See Wine.

FINISHING, in architecture, is frequently uſed for a crowning, acroter, &c. raiſed over a piece of building, to terminate, complete, or finiſh it. See the article Crowning.

FINITE, ſomething bounded or limited, in contradiſtinction to infinite. See the article Infinite.

FINITOR, in aſtronomy, the ſame with horizon, ſo called becauſe it terminates the ſight or proſpect. See Horizon.

FINNIKIN, the Engliſh name of a ſpecies of pigeon, remarkable for its wheeling round ſeveral times, whenever it courts the female.

FIRE, a general name, by which men ſeem to underſtand a certain ſenſation, or complex notion, of light, heat, burning, melting, &c.

The power of fire is ſo great, its effects ſo extenſive, and the manner of its acting ſo wonderful, that ſome of the wiſeſt nations of old, reverenced and worſhipped it as the ſupreme deity. Some of the chemiſts alſo, after they had diſcovered its ſurpriſing operations, ſuſpected it to be an uncreated being: and, indeed, the moſt famous of them have acknowledged it as the ſource of all their knowledge; and hence have profeſſed themſelves philoſophers by fire, nor thought they could be honoured with a nobler title. Now, amongſt all the wonderful properties of fire, there is none more extraordinary than this, that though it is the principal cauſe of almoſt all the ſenſible effects that continually fall under our obſervation, yet it is itſelf of ſo infinitely a ſubtle nature, that it illudes the moſt ſagacious enquiries, nor ever comes within the cognizance of our ſenſes; and hence others have been led to be of opinion, that it ought to be looked upon as ſpirit rather than body. Fire is generally divided into three kinds or ſpecies, viz. celeſtial, ſubterraneous, and culinary.

By celeſtial fire is principally underſtood that of the ſun, without regard to that of the fixed ſtars, though this, perhaps, may be of the ſame nature.

By ſubterraneous fire we underſtand that which manifeſts itſelf in fiery eruptions of the earth, volcanoes, or burning mountains; or by any other effects it produces in mines, or the more central parts of the earth.

By culinary fire we mean that employed in all chemical operations, and the common occaſions of life.

The ſun's heat appears to be the actuating principle, or general inſtrument of all the operations in the animal, vegetable, atmoſpherical, marine, and mineral kingdoms.

Fire, conſidered in itſelf, ſeems to exiſt, in the greateſt purity and perfection in the celeſtial regions; at leaſt, we are inſenſible of any conſiderable ſmoke it yields: for the rays of light come to us from the ſun, unmixed with any of that groſs, feculent, or terreſtrial matter, found in culinary and ſubterranean fires: but, allowing for this difference, the effects of the ſolar fire appear the ſame as thoſe of culinary fire.

If we examine the effects of ſubterraneous fires, we ſhall find them the ſame with thoſe produced by culinary fire. Thus burnt coals, cinders, and melted minerals, are thrown up by Veſuvius and other burning mountains. Warm nephritical exhalations, natural hot ſprings, ſteams, vapours, ſmoke, &c. are found in ſeveral parts of the globe, riſing nearly in the ſame manner as if they were produced by the heat of a furnace. Whence it appears, that ſubterraneous fires are of the ſame nature with the culinary.

All the phyſical knowledge we can have of a ſubject, muſt ariſe from attending to its properties and effects: but theſe properties and effects can never be diſcovered without the help of experiments; which, in philoſophical enquiries, are the only interpreters betwixt the ſenſes and the reaſon: whence all thoſe notions of fire ſhould be rejected as precarious and unſound, that are taken from the direct teſtimony of the ſenſes, or the naked reaſon unaſſiſted by experiments. In this enquiry, therefore, the mind ſhould particularly be kept unprepoſſeſſed, and, before it pronounces, wait for full information. As men generally affix to the word fire, a complex idea of burning, light, heat, melting, &c. this idea ſhould be analyſed, in order to ſee what parts are eſſential, and what precarious or arbitrary.

We frequently find the effects of fire produced, where no viſible fire appeared. Thus the fingers are eaſily burnt by an iron heated below the degree of ignition, or ſo as to be no ways viſibly red-hot or fiery: whence it follows, that the eye is no judge of fire.

So likewiſe the touch gives us no poſitive notice of any degree of fire below the natural heat of the body, or any ſo great as to deſtroy the organ.

Again, the effects of fire are often produced without any manifeſt ſigns of burning, melting, &c. as in evaporations, &c. If this method of excluſion and rejection were purſued to its due length, we ſhould, perhaps, find no criterion, infallible mark, or characteriſtic of fire in general, but that of a particular motion ſtruggling among the minute parts of bodies, and tending to throw them off at the ſurface. If this ſhould prove the caſe, then ſuch a motion will be the form and eſſence of fire, and which, being preſent, makes fire alſo preſent; and, when abſent, makes fire alſo abſent: whence to produce, and produce this motion in bodies, will be one and the ſame thing. See ELECTRICITY.

The great and fundamental difference in reſpect to the nature of fire is, whether it be originally ſuch, formed thus by the Creator himſelf at the beginning of things, or whether it be mechanically producible from other bodies, by inducing ſome alterations in the particulars thereof. The former opinion is maintained by Homberg, Boerhaave, the younger Lemery, and s'Graveſande; the latter is chiefly ſupported by the Engliſh philoſophers, lord Bacon, Mr. Boyle, and Sir Iſaac Newton.

Bacon, in the treatiſe De Forma Calicli, deduces, from a great number of particulars, that heat in bodies is no other than motion, ſo and ſo circumſtanced; ſo that, to produce heat in a body, nothing is required but to excite a certain motion in the parts thereof.

Boyle ſeconds him in an expreſs treatiſe of the mechanical organ of heat and cold, and maintains the ſame doctrine with new obſervations and experiments; as a ſpecimen of which we ſhall here give the two following:

1. In the production of heat, ſays that able philoſopher, there appears nothing on the part either of the agent or patient, but motion and its natural effects. When a ſmith briſkly hammers a piece of iron, the metal thereby becomes exceedingly hot; yet there is nothing to make it ſo, except the forcible motion of the hammer impreſſing a vehement and variouſly determined agitation on the ſmall parts of the iron, which, being a cold body before, grows, by that ſuper-induced commotion of its ſmall parts, hot: firſt, in a more looſe acceptation of the word, with regard to ſome other bodies, compared with which it was cold before; then ſenſibly hot, becauſe this agitation ſurpaſſes that of the points of our fingers; and in this inſtance oftentimes the hammer and anvil continue cold after the operation; which ſhews that the heat acquired by the iron was not communicated by either of thoſe implements, as heat; but produced in it by a motion, great enough ſtrongly to agitate the parts of ſo ſmall a body as the piece of iron, without being able to have the like effect upon ſo much greater maſſes of metal as the hammer and the anvil: though, if the percuſſions were often and briſkly renewed, and the hammer were ſmall, this alſo might be heated: whence it is not neceſſary that a body itſelf be hot to give heat.

2. If a large nail be driven by a hammer into a plank of wood, it will receive ſeveral ſtrokes on its head before it grows hot; but when it is once driven to the head, a few ſtrokes ſuffice to give it a conſiderable heat; for while, at every blow of the hammer, the nail enters farther into the wood, the motion produced is chiefly progreſſive, and is of the whole nail tending one way; but when that motion ceaſes, the impulſe given by the ſtroke being unable to drive the nail farther on, or break it, muſt be ſpent in making a various, vehement, and inteſtine commotion of the parts among themſelves, wherein the nature of heat conſiſts.

Agreeable to this, is the opinion of Sir Iſaac Newton; who conceives, that groſs bodies may be converted into light, by the agitation of their particles: and light, again, into groſs bodies, by being fixed therein.

On the other hand, M. Homberg, in his Eſſai du Souffre Principe, holds, that the chemical principle, or element ſulphur, which is ſuppoſed one of the ſimple, primary, pre-exiſtent ingredients of all natural bodies, is real fire, and conſequently that fire is coeval with bodies.

Dr. s'Graveſande goes on much the ſame principle: fire, according to him, enters the compoſition of all bodies, is contained in all bodies, and may be ſeparated or procured from all bodies, by rubbing them againſt each other; and thus putting their fire in motion: but fire, he adds, is by no means generated by ſuch motion.

Mr. Lemery, the younger, agrees with theſe two authors in aſſerting this abſolute and ingenerable nature of fire: but he extends it farther. Not contented to confine it as an element to bodies, he endeavours to ſhew, that it is equally diffuſed through all ſpace, and that it is preſent in all places; in the void ſpaces between bodies, as well as in the inſenſible interſtices between their parts.

This laſt ſentiment falls in with that of Boerhaave, and the celebrated M. Muſſchenbroek. But notwithſtanding what thoſe able philoſophers have advanced, it is evident that fire, heat, flame, &c. are only the different modifications of the particles of light, and that the particles of light themſelves depend entirely on velocity for their lucific quality; ſince, by many experiments, we know, that the particles of bodies become lucid, or particles of light, by only producing in them a requiſite degree of velocity: thus the particles in a rod of iron, being hammered very nimbly, ſhine and become red-hot; thus alſo the violent ſtroke of the flint againſt the ſteel, in ſtriking fire, puts the particles of the ſteel, which it takes off, into ſuch a motion as cauſes them to melt and become red-hot, which makes the ſparks of fire produced by each ſtroke: as, therefore, fire conſiſts in the great velocity of the particles, ſo it may be communicated from one body in which it is, to another in which it is not, after the ſame manner that one body in motion will communicate motion to another that has got none.

Fire differs from heat only in this, that heat is a motion in the particles of a body, with a leſſer degree of velocity; and fire a motion with a greater degree of velocity, ſuch as is ſufficient to make the particles ſhine; though we often call ſuch a ſtate as will burn, fire, though it does not actually ſhine; and we ſeldom call thoſe lucid bodies fires, which only ſhine, and do not burn. Theſe are a ſort of phoſphori, which, though they have no heat, yet ſeem to owe their lucidity to the motion of their parts. See the articles HEAT and PHOSPHORUS.

There ſeems to be no other difference between fire and flame, than this, that fire conſiſts in a glowing degree of velocity in the parts of a body, while yet ſubſiſting together in the maſs; but flame is the ſame degree of velocity in the particles diſſipated and flying off in vapour: or, to uſe Sir Iſaac Newton's expreſſion, flame is nothing elſe but a red-hot vapour. See the article FLAME.

FIRE, in chemiſtry, the great inſtrument by which moſt of the operations in that art are performed.

The kind, degree, direction, &c. of fire, are things the chemiſt is principally to attend to. There are, in chemiſtry, as many kinds of fire as there are mediums through which it may be conveyed, or fuels that afford it. For common uſe, fire is conveyed through aſhes, ſand, water, &c. or directly through the containing veſſel. Hence, fires are denominated of various kinds, as thoſe of ſand, filings of iron, and aſhes, the reverberatory fire, the ignis rotæ, or fire for fuſion, the lamp fire, the balneum mariæ, the vapour bath, and the fire of ſuppreſſion. The chemiſts uſe alſo ſeveral other kinds of heats, which may be claſſed among the fires, ſuch as inſolation, a bath of horſe-dung, a bath of the ſkins of grapes, and the heat of quick lime.

For the balneum arenoſum, or the fires or baths of ſand, filings of iron, and aſhes, balneum mariæ, balneum vaporis, or vapour-bath, ſee BALNEUM.

The reverberatory fire is made in a furnace covered with a dome, that by this means the heat or flame, which has always a tendency to make its eſcape at the ſuperior parts of the furnace, may be reverberated, or beat back on the veſſel immediately expoſed to it. To expoſe a veſſel to a naked fire, or to diſtil with a naked fire, is when there is no intermediate ſubſtance between the diſtilling veſſel and the fire.

The ignis rotæ, or fire for fuſion, is when a crucible or any other veſſel containing the matter deſtined for fuſion, is ſurrounded with live coals.

Lamp fire is when any matter contained in a glaſs veſſel is rendered hot by the equable heat of a lighted lamp.

Fire of ſuppreſſion is when, in order to diſtil per deſcenſum, the fire is laid above the matter, ſo that the moiſture forced from it, by means of the heat, is precipitated to the bottom of the veſſel; or when the body of the retort, or other veſſel, is covered over with fire.

Inſolation is when any matter deſigned either to be put into fermentation or dried, is expoſed to the heat of the ſun.

The bath of horſe dung, called alſo the horſe's belly, is when a veſſel containing any matter to be either digeſted or diſtilled, is placed in a large heap of horſe-dung.

Bath of the ſkins of grapes, like the bath of horſe-dung, ſerves for digeſtions or diſtillations; the ſkins are to be collected after the vintage.

The heat of quick-lime moiſtened, may ſerve for ſome diſtillations.

Some difference may be found in the effects produced by theſe different fires, applied in the ſame degree: but they have not, perhaps, been noted as they deſerve. In ſeveral bodies it is evident, that dry and moiſt heats have different effects, which we may find remarkably in the common culinary operations of boiling, roaſting, baking, &c. and hence, when the ſame effects are required perfectly ſimilar, the ſame kinds, as well as degrees, of fire are to be uſed.

The pureſt fire is that of alcohol, or perfectly pure ſpirit of wine; the next in purity is that of diſtilled oils; the next, that of charcoal, or charred turf; and the impureſt, pit coal: but all theſe have nearly the ſame effect, when received through the ſame kind of medium.

Degrees of FIRE.—The laſt thing to be conſidered is, how to regulate and aſcertain the degrees of fire in chemical operations, ſo as to produce the effects required in every caſe. The common directions of chemiſts about this matter are full of uncertainty; the firſt, ſecond, third, and fourth degrees of heat, or fire, meaning no preciſe degrees, meaſured by any ſtandard: however, according to Boerhaave, they are as follow:

The firſt degree of fire is that by which nature performs the office of vegetation in plants, and whereby chemiſtry imitates or does the like: this commences from the higheſt degree of cold, which, in Fahrenheit's thermometer, is denoted by one, and ends at eighty degrees; ſince in this whole interval we find certain plants give indications of life and growth. This heat is ſuited to extracting of the native ſpirits of odiriferous vegetables with oils, as that of roſes, jeſſamin, &c. and again, to making the more curious inſolations, &c.

The ſecond degree of fire may be accounted that of the human body, in a healthy ſtate. This degree is always greater than that of the ambient air, and may be ſuppoſed to commence at the 40th degree of the thermometer, and end about the 94th. Within this compaſs animals may live and ſubſiſt, that is, if their juices be of any degree of heat within theſe bounds. This degree is adapted to vinous and acetous fermentation, putrefaction, excluſion of the chick, the finer digeſtions, the making of tinctures and elixirs; and the adepts have uſed it for the firſt digeſtion of their mercury, by carrying the including veſſel conſtantly in their pocket.

The third degree of fire is that which extends from 94 degrees of the thermometer to 212, at which laſt water uſually boils. This degree is required in the diſtillation of ſimple and compound waters, the eſſential oils of vegetables, and will coagulate or conſolidate the ſerum, blood, and other animal juices, and conſequently deſtroy the creatures.

The fourth degree may be taken from 211 to 600 of the thermometer, within which latitude quickſilver or oil of vitriol boils, diſtils, or becomes volatile. This degree is ſuited to the melting of lead, tin, biſmuth, &c. and the ſubliming of ſal armoniac and ſulphur, the calcining of antimony, &c.

The fifth degree is that wherein the other metals melt, and which commences from 600 degrees of the thermometer, and ends where iron is held in a ſtate of fuſion. In this degree moſt bodies are deſtroyed; but glaſs, gold, ſilver, copper, and iron, remain long unchanged; all other fixed bodies grow red-hot in this degree, and all the unvitrifiable ſtones are calcined.

The ſixth and higheſt degree of fire, hitherto known, is that of the burning lens, or concave, by M. Villette, Tſchirnhauſen, Buffon, and others. The focus of theſe lenſes will even volatilize what is called the metalline or murcurial part of gold, and vitrify the more terreſtrial. See the article BURNING-GLASS.

The fires of ſand, filings of iron, and aſhes, have generally their degrees from the firſt to the third: the reverberatory fire has its degrees from the firſt to the fourth: the ignis rotæ ſerves for calcinations and fuſions; and a veſſel may receive different degrees of heat from a lighted lamp: the balneum mariæ and balneum vaporis have alſo their degrees: as has the fire of ſuppreſſion its degrees: inſolation has its degrees in proportion to the heat of the ſun, to which the ſubſtances are expoſed: the bath of horſe-dung has its degrees according to the bulk of the heap, or the place in which it is lodged: the bath of grape-ſkins has alſo its degrees like that of the bath of horſe-dung, and the heat of quick-lime has alſo its degrees; for according as we deſire it more or leſs ſtrong, we expoſe it to powder longer or ſhorter in the open air; and when we have occaſion for all its heat, we uſe it as quick as we poſſibly can.

FIRE, in medicine. See CAUSTIC.

FIRE, in ſurgery. See CAUTERY.

St Anthony's FIRE, in medicine. See the article ERYSIPELAS.

Walking FIRE, in meteorology. See WILL-WITH-A-WAISP.

FIRE, in theology. See the articles HELL, CONFLAGRATION, &c.

FIRE, in the art of war, a word of command to the ſoldiers, to diſcharge their muſquets; to the cavalry, to diſcharge their carbines or piſtols; to the grenadiers, to fire their granadoes; and to the gunners, to fire the guns.

Running FIRE is when a rank of men, drawn up, fire one after another; or, when the lines of an army are drawn out to fire on account of a victory, each ſquadron or battalion takes it from another, from the right of the firſt line to the left, and from the left to the right of the ſecond line.

FIRE ARMS are all ſorts of arms charged with powder and ball, as cannon, muſquets, carbines, piſtols, blunderbuſſes, &c. See the articles CANNON, GUN, &c.

FIRE-ARROWS, certain deſtructive inſtruments uſed by privateers to ſet fire to the ſails of the enemy: they are ſhot from a muſketoon or ſwivel-gun; and being furniſhed with ſprings to prevent their going entirely through the ſails, a match, being previouſly dipt in ſulphur and nitre, is wound about the ſhaft of the arrow, which is iron, and this immediately catches fire, as ſoon after the exploſion.

FIRE-BALL, in the art of war, a compoſition of meal-powder, ſulphur, ſalt-petre, pitch, &c. about the bigneſs of a hand-grenade, coated over with flax, and primed with a ſlow compoſition of a fuſee. This is to be thrown into the enemy's works in the night-time, to diſcover where they are; or to fire houſes, galleries, or blinds of the beſiegers; but they are then armed with ſpikes or hooks of iron, that they may not roll off, but ſtick or hang where they are deſigned to have any effect.

Fire-Bare, in our old cuſtoms, ſignifies a beacon, or tower, by the ſea-ſide, wherein there were kept continual lights.

Fire-Bote, is fuel or firing for neceſſary uſe, allowed to tenants, out of the lands granted to them.

Fire-Engine. See the article Engine.

Fire-Lock. See Gun, Musquet, &c.

Fire-Master, in our train of artillery, an officer who gives the directions and proportions of ingredients for each compoſition required in fire-works, whether for the ſervice of war, or for rejoicings and recreations.

His orders are given to the fire-workers and bombardiers, who muſt execute them.

Fire-Pots, in the military art, ſmall earthen pots, into which is put a charged grenade, and over that powder enough till the grenade is covered, then the pot is covered with a piece of parchment, and two pieces of match acroſs, lighted: this pot being thrown where it is deſigned, it breaks and fires the powder, and burns all that is near it, and likewiſe fires the powder in the grenade, which ought to have no fuſe, to the end its operations may be the quicker.

Fire-Ships, in the marine, certain old ſhips attendant on a fleet, to deſtroy any of the enemy's ſhips.

They are provided with a train, which is conſtantly laid ready for execution, and runs round the ſhip's lower deck ſpirally from one end to the other; they have alſo grappling-irons at their yard-arms, to hook the enemy's rigging, &c. When they are firmly grappled, the boat is drawn up to the ſhip on the oppoſite ſide to the enemy, and fire is ſet to the train, the captain being the laſt man who leaves the ſhip on this occaſion, which is a very dangerous enterprize. See that part of the article *Sea* Fight, which treats of the ancient marine war.

Fire-Workers, officers ſubordinate to the fire-maſter.

Fire-Works. See Pyrotechnia.

Wild Fire, a kind of artificial or factitious fire, which burns even under water, and that with greater violence than out of it. It is compoſed of ſulphur, naphtha, pitch, gum, and bitumen; and is only extinguiſhable by vinegar mixed with ſand and urine, or by covering it with raw hides. Its motion or tendency is ſaid to be contrary to that of natural fire, and it always follows the direction in which it is thrown, whether it be downwards, ſideways, or otherwiſe.

Several are of opinion that the ancient Greeks and Romans uſed this fire in their engagements at ſea: whether or not that was the caſe, it was applied againſt the Saracens in a ſea-fight, commanded by Conſtantine Pogonates, in the Heleſpont, and with ſuch effect that he burnt the whole fleet therewith, wherein were thirty thouſand men.

Electrical Fire. See Electricity.

FIRING-Iron, in farriery, an inſtrument not unlike the blade of a knife; which being made red-hot, is applied to a horſe's hams, or other places ſtanding in need of it, as in preternatural ſwellings, farcy knots, &c. in order to diſcuſs them. Sometimes this is done for wrenches of the paſterns

FIRKIN, an Engliſh meaſure of capacity, for things liquid, being the fourth part of the barrel: it contains eight gallons of ale, ſoap, or herrings; and nine gallons of beer. See Measure and Barrel.

FIRLOT, a dry meaſure uſed in Scotland. The oat-firlot contains 21¼ pints of that country; the wheat-firlot contains about 2211 cubical inches; and the barley-firlot 31 ſtandard pints. Hence it appears that the Scotch wheat-firlot exceeds the Engliſh buſhel by 33 cubical inches. See the article Measure.

FIRMAMENT, in the old aſtronomy, the eighth ſphere, or heaven, with regard to thoſe of the ſeven planents which it ſurrounds. Beſides the diurnal motion, according to Ptolemy, given it by the primum mobile, from eaſt to weſt round the poles of the equator, it has an oppoſite motion to this, from weſt to eaſt upon the poles of the ecliptic, called the ſecondary motion: by this the fixed ſtars advance, according to the order of the ſigns, about one degree in 70 or 72 years. More properly, the firmament is that ſpace expanded above us in the heavens.

The word is Latin, *firmamentum*, and derived from *firmus*, ſure, or ſtedfaſt.

FIRMAN is a paſſport or permit granted by the Great Mogul to foreign veſſels, to trade within the territories of his juriſdiction.

FIRMNESS, *Firmitas*, denotes the conſiſtence of a body, or that ſtate wherein its ſenſible parts co-here in ſuch a manner, that the motion of one part induces a motion of the reſt.

FIRST-Fruits, *Primitiæ*, among the Hebrews, were oblations of part of the fruit of the harveſt, offered to God as an acknowledgment of his ſovereign dominion.

First-Fruits, in the church of England, are the profits of every ſpiritual benefice for the firſt year, according to the valuation thereof in the king's books. See the article Annates.

FIR-Tree, *Abies*, in botany, a genus of ever-green trees, whoſe leaves are ſingle, and for the moſt part produced on every ſide of the branches; the male flowers or catkins are placed at remote diſtances from the fruit on the ſame tree; the ſeeds are produced in cones, which are ſquamoſe.

The difference between theſe and the pines is, the latter having two or more leaves produced out of the ſheath or cover.

Theſe trees are all raiſed from ſeeds taken out of their polyſphermous cones. The way to get out the ſeeds is, either by expoſing the cones to a gentle fire, or by ſoaking them all night in water, which will cauſe their ſquamoſe cells to open, and readily emit their ſeeds. The former method is the beſt, provided they are not expoſed to too great heat. But this ought not to be done until you are ready to ſow them; which is beſt performed in the beginning of March.

Theſe plants ſhould be all raiſed in the nurſery, where they may be protected from the birds; otherwiſe they will be in danger of being deſtroyed, when they firſt come up: for as they bring up the huſk of the ſeed on the top of the plant, the birds in picking off the huſk will break off the plant, whereby a whole bed may be loſt in a few hours, if they are not carefully guarded from them.

The beſt time of ſowing theſe ſeeds is about the latter end of March, or the beginning of April, on a bed of light earth, covering the ſeeds about half an inch deep with the ſame ſort of earth. In this bed the plants ſhould remain until the following ſpring, when there ſhould be a number of beds prepared in the nurſery to receive theſe ſeedling plants; and the beginning of April they ſhould be tranſplanted into the beds, at the diſtance of ſix inches row from row, and at three inches aſunder in the rows. If the ſeaſon ſhould prove dry, it will be proper to water the plants every week once or twice, according to the warmth of the weather; and the beds ſhould be covered with mats, to ſcreen the plants from the ſun, and drying winds, until they have taken good root; after which time they will require no farther care, but to keep them clear from weeds. In theſe beds the plants may remain two years; at the end of which they ſhould be tranſplanted into an open ſpot of ground; for their roots will in that time meet quite over the beds.

The diſtance which theſe plants ſhould be placed in this nurſery, ſhould be four feet, row from row, and two feet aſunder in the rows.

When the plants are planted, if the ſeaſon ſhould prove dry, they ſhould be watered, to ſettle the earth to their roots; and if this is repeated three or four times, if the ſeaſon ſhould continue dry, it will greatly promote their taking new root, and ſecure them from the injuries of the drying winds. In this nurſery the plants may remain two or three years, according to the growth they ſhall have made; and, during this time, the ground between the plants ſhould be conſtantly kept clean from weeds, and dug between the rows every ſpring; in doing of which, care muſt be taken not to cut or injure the roots of the plants: this is all the culture they will require during their continuance in the nurſery: and, when they are tranſplanted into the places where they are to remain, the neceſſary care to be taken is, in taking them up, not to injure or cut off the roots, and let them be as little time out of the ground as poſſible; and, when they are out, to guard their roots from the drying winds. The ſureſt time for removing of theſe trees is about the beginning of April; though they may, and often are removed with ſucceſs at Michaelmas, yet the ſpring is the more ſure ſeaſon, eſpecially in moiſt land.

Moſt of the kinds of firs may be removed at the height of ſix or ſeven feet; but thoſe of two feet high are much better, and will in a years get the better of thoſe taller trees. *Miller's Gard. Dict.*

FISC, *Fiſcus*, in the civil law, the treaſury of a prince.

FISCAL, in the civil law, ſomething relating to the pecuniary intereſt of the prince or people.

FISH, in natural hiſtory, an animal which lives in the water, that being its natural element.

Willoughby, after Ariſtotle, has accurately diſtinguiſhed fiſhes into *cetaceous*, *cartilaginous*, and *ſpinous*.

The *cetaceous*, called alſo *belluæ marinæ*, have lungs, and breathe like quadrupeds: they copulate alſo like them, and conceive and bring forth their young alive, which they afterwards ſuckle with their milk.

The *cartilaginous* ſort are thoſe produced from eggs like large birds; which are alſo excluded the womb like thoſe of birds.

The *ſpinous* kind are alſo oviparous; but their eggs are ſmaller, and they have ſpinæ up and down in their fleſh to ſtrengthen them.

The ſame author is likewiſe of opinion that it would be alſo proper to divide fiſhes into ſuch as breathe with lungs, and ſuch as breathe with gills; and then to ſubdivide thoſe that breathe with gills into vivaparous and oviparous.

Naturaliſts remark that the ſtructure of fiſhes, and their confirmation to the element they reſide in, is very wonderful. Their bodies are cloathed and guarded in the beſt manner, with ſcales or ſhells, ſuitable to their reſpective circumſtances, the danger they are expoſed to, and the motion and buſineſs they are to perform. The center of gravity is placed in the propereſt part of the body for ſwimming; and their ſhape the beſt adapted to their making their way through the water, and moſt conformable to the rules of geometry. They have ſeveral parts peculiar to themſelves; as fins to balance and keep them upright, and an air-bladder to enable them to riſe and ſink at pleaſure. They have gills or branchiæ, whereby to reſpire, as animals do by their lungs. The tail is the inſtrument of progreſſive motion, and ſerves to row them forward. Their eyes are peculiarly formed to enable them to correſpond with all the conveniencies and divergencies of rays, which the variations of the watery medium, and refractions thereof, may occaſion; in which reſpect they bear a near reſemblance to birds.

FISH, among ſeamen, a machine for drawing up the flooks of the ancher to the davit. See the article DAVIT.

It is compoſed of four parts, viz. the hook, the pendant, the block, and the tackle.

The pendant is a piece of ſtrong rope paſſing through the block, hung over the end of the davit, which projects out from the forecaſtle to keep the anchor at a diſtance from the ſhip's ſide, that the flooks may not tear it as they are drawn up: at one end of the pendant is faſtened the hook, which is of ſufficient ſtrength and capacity to grapple the flooks under water, and ſuſtain their weight: at the other end of the pendant is fixed the tackle, which is a complication of pullies, to perform this operation.

FISHES *of the Maſt*, certain pieces of wood hollowed on one ſide, and convex on the other, faſtened ſecurely on the maſts of a ſhip to ſtrengthen them, either when it is apprehended there is a neceſſity for this additional ſupport to bear an extraordinary preſſure of ſail; or after they may have ſuſtained ſome damage from a former occaſion.

FISH-PONDS, thoſe made for the breeding or feeding of fiſh.

FISHERY, a place where great numbers of fiſh are caught.

The principal fiſheries for ſalmon, herring, mackrel, pilchards, &c. are along the coaſts of England, Scotland, and Ireland; for cod, on the banks of Newfoundland; for whales, about Greenland; and for pearls, in the Eaſt and Weſt Indies.

FISHERY denotes alſo the commerce of fiſh, more particularly the catching them for ſale.

FISSURE, *Fiſſura*, a chap or crack, in ſurgery, is either natural or morbid: thus, the mouth, &c. is frequently called a natural fiſſure: morbid fiſſures are either thoſe of the cranium or other bones, or chaps of the ſkin, which ſometimes happen about the lips, anus, and other parts of the body.

The word is Latin, *fiſſura*, and derived from *findo*, to ſplit or cleave.

FISSURE, in philoſophy, is frequently applied to thoſe diviſions that are to be met with between layers of different kinds of earth or ſtone.

FISTULA, in ſurgery, a deep, narrow, and callous ulcer, generally ariſing from abſceſſes or ulcers.

The word is Latin, and literally ſignifies a pipe; this diſorder being ſo called from its reſemblance to a pipe or reed.

FISTULA *in Ano*, in ſurgery, an abſceſs running upon or into the inteſtinum rectum; though an abſceſs in this part, when once ruptured, does generally, if neglected, grow callous in its cavity and edges, and becomes, at laſt, what is properly called a fiſtula.

FISTULA LACHRYMALIS, a diſeaſe which attacks the great caruncle in the inward corner of the eye. See the article EYE.

FISTULAR, or FISTULOUS, appellations given by ſurgeons to wounds and ulcers, which degenerate into fiſtulas.

FISTULAR, among botaniſts, is applied to leaves and flowers that are tubular, or reſemble a hollow pipe.

FIT, in medicine, denotes much the ſame with paroxyſm. See PAROXYSM.

FITS *of eaſy Reflection and Tranſmiſſion*, in optics. See the articles REFLECTION and TRANSMISSION.

FITCHEE, in heraldry, a term applied to a croſs, when the lower end of it is ſharpened into a point.

FITTING-OUT, in the ſea-language, the act of providing a ſhip with a ſufficient number of men to navigate her; alſo with proviſions of all ſorts, artillery, ammunition, maſts, yards, ſails, cordage, anchors, and other furniture: alſo the rigging and ſecuring her maſts againſt the dangers of the wind and ſea.

FIXATION, in chemiſtry, the rendering any volatile ſubſtance fixed, ſo as not to fly off upon being expoſed to a great heat; hence,

FIXED BODIES are thoſe which bear a conſiderable degree of heat without evaporating, or loſing any of their weight.

FLACCIDITY, among phyſicians, a diſorder of the ſolids, cured by aſtringent and cardiac medicines, joined with exerciſe and good air.

FLAG, in the ſea language, the banners or colours by which an admiral is diſtinguiſhed at ſea.

FLAGS *in the Britiſh Navy*, are either red, white, or blue; and they are hoiſted either at the heads of the main-maſt, fore-maſt, or mizen-maſt.

Flags, when diſplayed from the top of the main-maſt, are the diſtinguiſhing marks of admirals; when from the fore-maſt of vice-admirals; and when from the mizen-maſt, of rear-admirals.

The higheſt flag in the Britiſh navy is the anchor and rope, which is only diſplayed when the lord-high admiral, or lords commiſſioners of the admiralty are on board; the next is the union, the diſtinction peculiar to the ſecond officer, called admiral of the fleet; and the loweſt flag is the blue at the mizen-maſt.

FLAGELLANTES, WHIPPERS, in church hiſtory, certain enthuſiaſts in the thirteenth century, who maintained that there was no remiſſion of ſins without flagellation, or whipping. Accordingly they walked in proceſſion, preceded by prieſts carrying the croſs, and publicly laſhed themſelves, till the blood dropped from their naked backs.

FLAGEOLET, or FLAJEOLET, a little flute, uſed chiefly by ſhepherds and country people. It is made of box, or other hard wood, and ſometimes of ivory, and has ſix holes beſides that at the bottom, the mouth-piece, and that behind the neck. See FLUTE.

FLAIL, an inſtrument for threſhing corn. See CORN and THRESHING.

FLAKE, among gardeners, a kind of ſtriped carnations, with only two colours.

FLAMBEAU, a kind of large taper, made of hempen wicks, by pouring melted wax on their top, and letting it run down to the bottom. This done, they lay them to dry; after which they roll them on a table, and join four of them together by means of red-hot iron; and then pour on more wax, till the flambeau is brought to the ſize required.

FLAME, *Flamma*, in phyſiology, the ſmall parts of an inflammable or conſiderably unctuous body, that are ſet on fire, or briſkly agitated and thrown off, with a certain vibrative motion at the ſurface of that body into the open air: or, in Sir Iſaac Newton's words, the flame of a body is only the ſmoke thereof heated red-hot; and the ſmoke is only the volatile part of the body ſeparated by the fire. See FIRE and SMOKE.

FLAMEN, in Roman antiquity, the name of an order of prieſts, inſtituted by Romulus or Numa; authors not being agreed on this head.

FLANCH, FLANQUE, or FLASQUE, in heraldry, an ordinary always borne double, being the ſegment of a circular ſuperficies.

FLANNEL, or FLANEL, a looſe ſort of woollen ſtuff not croſſed, and wove on a loom with two treddles, like bays.

FLANK, in the menage, the ſide of a horſe between the ribs and haunches.

FLANKS *of an Army*, are the troops encamped on the right and left, as the flanks of a battalion are the files on the right and left.

FLANK *of a Baſtion*, in fortification, that part which joins the face to the curtain. See the article BASTION.

Oblique FLANK, or *Second* FLANK, that part of the curtain from whence the face of the oppoſite baſtion may be diſcovered.

Retired FLANK, or *Low* FLANK, or *Covered* FLANK, one of the platforms of the cazemate. See the article CAZEMATE.

Theſe retired flanks are a great defence to the oppoſite baſtion, and the paſſage of the moat, becauſe the beſiegers cannot ſee nor eaſily diſmount their guns. The curtain is eſteemed the ſtrongeſt part of the fortification, becauſe flanked at both ends; and the face is accounted the weakeſt, as having only one defence from the oppoſite flank.

FLANKED ANGLE, in fortification, that formed by the two faces of a baſtion.

FLANKING ANGLE, or *Angle of the* TENAILLE, that compoſed of the two lines of defence, and pointing towards the curtain. See the article TENAILLE.

FLANKING *Line of Defence*. See the article LINE *of Defence*.

FLATS, in muſic, a kind of additional notes, which, together with ſharps, ſerve to remedy the defects of muſical inſtruments, wherein temperament is required. See TEMPERAMENT and SHARP.

FLATULENCY, in medicine, a diſorder of the bowels ariſing from a weak ſtomach, and crude flatulent aliment, as peaſe, beans, lentils, coleworts, hard fat fleſh, &c. which degenerate into wind, creating great anxiety if not evacuated, and difficulty of breathing.

Another cauſe of flatulencies are congeſtions of blood in the branches of the vena porta; whence proceed anxieties of the præcordia, difficult breathing, cholic pains, heart-burn, head-achs, vertigo, and watchfulneſs.

If the flatulency ariſes from crudities in the ſtomach, evacuations are firſt of all neceſſary; after which may be given bitters, aromatics, carminatives, and ſtrengtheners, with a ſpare diet and exerciſe. If it proceeds from congeſtions of blood, as is the caſe of hypochondriacs, a vein muſt be opened; and if the body is coſtive, an emollient clyſter or a gentle laxative will be proper. If theſe fail, chalybeate medicines are to be called in, as tincture of vitriol of iron, ſteel-filings finely powdered, from ſix to ten grains, or oil of cinnamon with ſugar or bitters, ſpaw-waters, and conſtant exerciſe.

FLAX, *Linum*, in botany, a plant from which linen is manufactured.

There are ſeveral ſpecies of this plant, which are preſerved in ſome curious gardens of plants for variety ſake; but, as they are of little uſe or beauty, it would be needleſs to expatiate on them in this place.

The linum ſativum, or manured flax, is that which is cultivated for uſe in divers parts of Europe, and is reckoned an excellent commodity: the right tilling and ordering of which is eſteemed a good piece of huſbandry.

This ſhould be cultivated upon a rich ſoil that has not been ploughed for ſeveral years, upon which flax always makes the beſt improvement: but, as it draws greatly from the ſoil, it ſhould not be ſown two years together upon the ſame ground. The land muſt be well ploughed, laid flat and even, upon which the ſeeds ſhould be ſown about the middle of March, when the weather is mild and warm. During the ſpring, you muſt carefully weed it; which if neglected, eſpecially in a moiſt ſeaſon, the weeds will over-grow and deſtroy the crop. There are ſome perſons who recommend the feeding of ſheep with flax, when it is a good height; and ſay, they will eat away the graſs and weeds, and do the flax good; and if they ſhould lie in it, and beat it down, or flatten it, the next rain that falls it will riſe again: but this muſt not be practiſed but in a moiſt ſeaſon, and upon a rich ſoil; for if the ground be poor, or the ſpring dry, it will not riſe again to any conſiderable height.

The beſt ſeed is that which comes from the Eaſt country, and is known by the name of Riga flax; for if the Engliſh ſeed be ſown three or four times, it is very apt to degenerate. If the ſeed be good, two buſhels will be enough to ſow an acre; but if it be but middling, there ſhould be a greater allowance.

Towards the latter end of Auguſt the flax will begin to ripen, when you muſt be careful that it grow not over ripe; therefore you muſt pull it up as ſoon as the heads begin to change brown, and hang downwards, otherwiſe the ſeeds will ſoon ſcatter, and be loſt; ſo that the pluckers muſt be nimble, and tie it up in handfuls, ſetting them upright till they be perfectly dry, and then houſe them. If the flax be pulled when it firſt begins to flower, it will be whiter and ſtronger than if it ſtand till the ſeed is ripe; but then the ſeed will be loſt.

This is a plant of the greateſt uſe in ſeveral of the moſt eſſential parts of life: from the ſeeds an expreſſed oil is drawn, which is of great uſe in medicine, painting, &c. from the bark of the ſtalks is made linen, and from the rags of linen is made paper; ſo that this plant may be eſteemed as one of the moſt valuable and neceſſary in many of the principal conveniencies of life. *Miller's Gard. Dict.*

This plant has a more oily taſte than mallow, and is the chief of the emollient tribe. The ſeeds afford an excellent medicine, ſince from them is expreſſed an oil, which is anodyne, demulcent, and extremely adapted to all manner of aſperities; it relaxes, and diſſolves acridities, whence it is of extraordinary ſervice in the moſt deſperate cholics. The ſtiff and rigid limbs, being anointed with this oil, are relaxed and rendered flexible. This oil, when freſh drawn, and taken at the mouth, is very good in a pleuriſy, and a cough, to help expectoration; and, injected in clyſters, is very proper in the hæmorrhoids, and indurated fæces, whence proceeds the cholic; mixed with ſealed and japan earth, it is a great arcanum in the dyſentery: an emulſion of the ſeeds is of ſervice in the pleuriſy and peripneumony; the oil is a very good remedy againſt the ſtone: the ſeeds reduced to a meal, and boiled and prepared in the form of a cataplaſm, are applied to tumours and abſceſſes, in order to mollify and ripen them. The ſeed, boiled in water, makes a mild oily decoction, preſcribed to be drank as an anodyne in inflammations of the ſmall inteſtines, the diarrhœa, the dyſentery, nephritic pains, and retention of urine. The oil, boiled with honey, clears the face and ſkin of ſpots, and all cutaneous blemiſhes. The leaves are emollient, and the ſmell of the flowers is not poiſonous, as ſome authors have written. To cloſe all, we ſhould obſerve, that whereas cotton can never be uſed about wounds, on account of its denticulated parts, which diſpoſe to inflammations; linen, the manufactured produce of this plant, is, by its extraordinary ſoftneſs, ſmoothneſs, and flexibility, of all other things, the beſt adapted to ſuch purpoſes. *Hiſt. Plant. aſcript. Boerhaave.*

As it is agreed that the lighteſt loams and the thickeſt crop afford the fineſt flax, it may be of uſe to let the farmer know how he may ſave ſuch crops from lodging, as they generally do. The method is a little expenſive; but if it anſwers, it will quit coſt very well. When the flax is in the ground, divide your field into equal ſquares, the ſides of which may be four or five feet long; and at each angle thruſt a forked ſtick ſteady in the ground. When your flax is ſome inches high, lay from ſtick to ſtick a light croſs pole; and this will ſupport the flax, and hinder it from lodging. Some uſe ropes inſtead of poles; but they yield too much, and anſwer but imperfectly.

High winds are ſo common in this country, that there is reaſon to apprehend, that the Dutch method of laying flax looſe upon the ground would be attended with conſiderable inconveniency. The following method is much ſafer: tie gently each handful as cloſe as may be to the heads; and then, ſpreading out the ends, ſet it upright on the ground. Three or four of theſe, together, make one ſtook; and into ſuch ſmall ſtooks divide all the flax you have. They ſoon dry, becauſe the wind has free acceſs to the ſtalks, as the ſun has to the heads, and the rain cannot lodge in any quantity upon them.

Rippling comes next. Two men may work at every inſtrument, by fixing it on a bench, that one may ſit at either end. Let them take ſmall handfuls at a time, and draw the flax through the ripple without violence. Two women to each bench are neceſſary to hand the flax in bundles to the ripplers, to receive it from them again, to ſort it according to their ſeveral degrees of length, ſtrength, ripeneſs, and fineneſs, and to tie it looſely in little ſheaves.

After rippling, the ſeed muſt be carried to the granary, and the flax laid down to water. If poſſible, diſpoſe of the whole into your ponds together. The ſummer, which draws haſtily towards an end, is your fitteſt ſeaſon, and ſhould be huſbanded with care: however, let nothing tempt you to uſe bog-holes and running waters. It is better to delay to the next ſeaſon, than to diſcolour or damage all your flax.

Cover your flax, to keep it down, with your ſlutch or mire at the bottom of your ponds, or, till that be gathered in ſufficient quantities, with clay, ruſhes, fern, or timber. From four to twelve or thirteen days is the time requiſite for watering. After the fourth, examine your flax daily, and be particularly careful not to let it lie too long. It is a miſtake, on the ſafer ſide, to draw it off the ſooneſt.

In graſſing, the ſhorteſt graſs ſhould be preferred. Dry ſand-banks do well. On either the flax muſt be turned every ſecond day, and generally lies from a fortnight to three weeks.

To dry your flax, heat your oven thoroughly; then let it cool, till a man can ſtand in it without uneaſineſs; fill it over night, and your flax will be ready for the break next morning. The dirt and ſtraws ſcutched out of the flax in one day, will heat the oven for the next.

When you break your flax, take ſheaf by ſheaf out of the oven, as you uſe it: it comes criſp under the engine, works the better and more eaſily. It is an error to lay the flax, as we do, as far as may be from the joint. The nearer it is placed to the center of motion in the break, the more eaſily it ſplits, and the leſs damage it receives.

In ſcutching, chuſe the broad round ſcutch: the ſquare and narrow one, in uſe among us, cuts and deſtroys the flax.

By the time the flax is ſcutched, and about the middle of October, it will be time to threſh the ſeed.

This may be done by driving horſes backwards and forwards on the bows, or by drawing over them a heavy rolling-ſtone upon a ſmooth hard floor.

Cleaning it requires more nicety. To do it thoroughly, it muſt firſt go through the winnow, which ſeparates it from the bows; through the riddle next, to take out ſtraws, ſtones, and larger dirt; then ſucceſſively through two different ſieves; the firſt bored with oval holes, to let through the ſeed, and nothing elſe of greater bulk; the ſecond cloſer, to retain the ſeed, and afford a paſſage to all ſmaller bodies; and laſtly, through the ſcreen or wire-harp, which frees it from all duſt.

When the flax-dreſſer has thus cleaned his ſeed, he ſhould return to his flax, and put it through the fining-mills. The wheel in theſe turns alternately from right to left, and from left to right, twice each way; and, according to the number of theſe double turns, the flax comes out the finer, the ſmoother, and the ſofter. Fourſcore ſuch turns is the moſt that any flax requires, and probably as much as it will bear.

N. B. For want of theſe fining-mills in Scotland beating of flax is directed.

In hackling, women and children ſhould be employed from choice. They work with greater gentleneſs than men; and care and tenderneſs are the main excellencies in this buſineſs. For the beſt flax, four ſets of hackles will be requiſite, each of them of a different fineneſs: through theſe it may be drawn ſucceſſively, and every time with proportionable caution. The laſt, whoſe teeth are like the fineſt needles, requires the utmoſt ſkill, and ſhould be truſted with few hands.

FLEA, *Pulex*, in zoology, a genus of inſects without wings, of a roundiſh, compreſſed figure: the legs are three pair, and formed for leaping; the eyes are two, and ſimple; the mouth is bent downwards; the colour is a deep purple, approaching to black.

FLEA-BITTEN, that colour of a horſe, which is white or grey, ſpotted all over with dark reddiſh ſpots. See HORSE.

FLEAM, in ſurgery and farriery, an inſtrument for letting a man or horſe blood.

FLEECE, the covering of wool, ſhorn off the bodies of ſheep. See WOOL.

Order of the Golden FLEECE, an order of knighthood inſtituted by Philip II. duke of Burgundy. Theſe knights were at firſt twenty-four, beſides the duke himſelf, who reſerved the nomination of ſix more; but Charles V. increaſed them to fifty. He gave the guardianſhip of this order to his ſon Philip, king of Spain; ſince which, the Spaniſh monarchs are chiefs of this order. The knights had three different mantles ordained them; at the grand ſolemnity, the collar and fleece.

FLEET, in naval affairs, a company of ſhips of war, or merchantmen, or both, bound on any particular expedition or voyage.

As the ſecurity, wealth, and glory of theſe kingdoms principally depend on the reſolution and ſkill with which our fleets are conducted, it may be thought neceſſary to give our readers, who are unacquainted with this ſubject, a clearer idea of the operations of fleets and ſquadrons, than they may have formed before; this we more cheerfully attempt, as it ſeems to have been wholly neglected hitherto in works of this kind.

The principal article to be conſidered in a fleet at ſea is order, by which is meant the different methods of ranging or drawing it up in ſeveral lines and forms for which it may be deſigned: in which, two things are to be conſidered; firſt, the poſition of each ſhip with regard to the wind; ſecond, the poſition of each ſhip with reſpect to the fleet. We cannot make any alteration in either of the circumſtances without changing the whole poſition of the line, which will otherwiſe remain complete. See the article LINE.

When a fleet engages, it ought to be drawn up in a different form from that in which it ſails. A fleet that ſails in ſight of an enemy muſt alter its poſition from that it would maintain, were there none in view, or none to be expected. When a fleet ſails before the wind, it has likewiſe its particular form of ſailing, as it has alſo when it chaſes an enemy, makes a retreat, guards a ſtreight or paſſage, or is obliged to force through one; or whether at anchor in a road or harbour, or going into either, to inſult or attack an enemy. In this variety of circumſtances, proper regard muſt be had to the moſt advantageous poſition or form the fleet can be ranged in, before it enters upon action.

There are three things to be conſidered before we can judge of the good form or diſpoſition of a fleet. 1. If that form puts it into the beſt diſpoſition of executing the admiral's deſign; ſuch as the moſt expeditious, as well as moſt commodious, order of ſailing on any enterprize, &c. or if, when obliged to retreat, ſuch arrangement ſecures it beſt from the attacks or purſuits of an enemy. 2. If that order cloſes the fleet more or leſs; becauſe the cloſer the ſhips are, they are the leſs liable to be ſeparated; the ſeveral commanders can better aid and aſſiſt each other upon any occaſion, and have the eaſier communication with their reſpective admirals and commanding officers. 3. If from this order the line of battle may be eaſieſt formed; becauſe all orders muſt tend principally to that, as the only one to engage to advantage. See EVOLUTION.

In a naval engagement, as we ſhall fully explain in that article, the ſhips are drawn up in a line of battle in two columns parallel to each other, cloſe upon a wind. CLOSE-HAULED.

There are ſeveral advantages which reſult from being to windward, as 1. the fleet to windward can edge down on the enemy, when and as near as ſhall be judged convenient; conſequently regulates the time and diſtance moſt advantageous to come to action; 2. if the fleet to windward is more in number, it may eaſily detach ſome ſhips to ſend after the rear of the enemy, which muſt undoubtedly throw them into confuſion; 3. if any of the ſhips of the fleet to leeward ſhould be diſabled, whether in the van or rear, or even in the center, the fleet to windward may with the greater eaſe ſend down their fire-ſhips upon them, or ſend a detachment after any part of the flying enemy: 4. we muſt alſo attribute, amidſt other advantages of being to windward, that of being ſooner freed from the inconvenience of the ſmoke of the enemy, as well as of our own; for the wind repelling the ſmoke of the cannon back again into the ſhip, ſo greatly incommodes thoſe who are quartered at the guns as to deprive them totally for ſome time of the ſight of the enemy.

On the other hand, the advantages of being to leeward are likewiſe conſiderable, inſomuch that there are who maintain they are at leaſt equal to thoſe of being to windward; but if all circumſtances are duly conſidered, they will certainly find the advantages of being to windward the greateſt a fleet can poſſibly have, whether ſuperior or inferior to the enemy; though we muſt allow, that, on ſome occaſions, as when the wind blows hard, it may be more adviſeable to get to leeward, if we can, eſpecially if the ſea runs ſo high that the weather, or windward fleet, cannot open its loweſt tier, when obliged to engage a great number of ſhips, or in an action between two ſingle ſhips.

1. The fleet to leeward fire to windward, and conſequently the ſhips may make uſe of their lower tier of guns, without being under apprehenſion that any ſudden ſquall of wind ſhould over-power them by the water ruſhing in irreſiſtably between decks; an advantage which the Engliſh fleet, under Sir Edward Hawke, had in ſome meaſure over the French fleet, commanded by M. Conflans, in that memorable action off Belleiſle, Nov. 20, 1759, where they fatally experienced our ſuperior ſkill, reſolution, and ſeamanſhip. This circumſtance is certainly the greateſt advantage a fleet to leeward can have; for it is difficult to conceive the confuſion and terror which ſudden guſts of wind occaſion amongſt the men between decks, when the waves pour in and lay the ſhip on her broadſide, ſo as often to endanger her overturning, or ſinking before the ports can be ſecured.

2. The fleet to leeward may eaſier cover any of their ſhips which are diſabled in action, which the fleet to windward cannot effect without great difficulty, and even the riſk of being deſtroyed in the attempt.

3. The fleet to leeward may more eaſily make a retreat if defeated, whereas the fleet to windward cannot ſo well eſcape, without being reduced to the neceſſity of forcing its way through the enemy's line, which muſt be attended with the moſt fatal conſequences.

When a fleet is obliged to retreat in ſight of an enemy, the beſt way to ſecure its retreat will be by ſailing in a ſort of half-moon, the admiral being in the center, the fleet divided and ranged in order, one half on the ſtarboard, and the other half ſtretching out on the larboard ſide, and keeping the fire-ſhips, tranſports, &c. in the middle. This manner of ranging a fleet ſeems the moſt adviſeable, becauſe the enemy can never approach thoſe who endeavour to eſcape, without expoſing themſelves at the ſame time to the fire of the ſhips to windward. If the admiral thinks this form gives too great an extent to his fleet, he may eaſily cloſe his wings or quarters, and make the half-moon more complete; in the midſt of which he may place his convoy in ſafety.

The moſt natural courſe, however, in this form of ſailing, is to ſteer away before the wind: but if neceſſary, the ſhips may bear away large on either tack, or even may keep cloſe upon a wind.

In chaſing a fleet that endeavours to eſcape, the beſt cruiſers are detached after them, in order to pick up the ſtragglers or force them to action: the body of the victorious fleet ſhould keep the ſame order or line with the enemy, as nigh as poſſible, to be ready for action if neceſſary. This, however, is only to be underſtood when the fleet that is chaced may not be ſo inferior to the other, but that it may hazard an action; for if the one bears no proportion to the other, they muſt bear down upon them in the ſame manner as a conquering army aſhore carries all before it when it has forced an enemy's camp: otherwiſe, were the conquerors to wait drawing up in form, the enemy would undoubtedly take the advantage of ſuch an opportunity to make their eſcape.

In order to protect the entrance of a ſtreight or paſſage in the moſt effectual manner, there ſhould be a fleet nearly double in number to that which would force its way through; there muſt then be two diviſions made, the one to keep one ſide while the other is ranged along the other, that when the enemy preſent themſelves at the entrance, the weathermoſt ſquadron may crowd all the ſail it can before the wind upon them, at the ſame time that the leeward ſquadron keeps its wind to intercept them: ſo that in this manner it will be impoſſible for the enemy to eſcape by any manœuvre it may attempt. The eſſential point of a commanding officer who attempts to force a paſſage, is to avail himſelf of the reigning winds which may beſt favour his deſigns, and poſſibly it would be moſt expedient to range his ſquadron in the form of a retreat, by cloſing the wings or quarters a little, to give them the leſs extent; in this the ſquadron can never be attacked without being able to defend itſelf from all quarters to greater advantage than in the former poſition.

When a fleet comes to an anchor, there are five circumſtances to be conſidered: 1. that the ground be good and holding; 2. that the place be well ſheltered againſt the reigning winds which blow on that coaſt; 3. that the ſhips may eaſily get under ſail with the ſame wind that may ſerve an enemy, and at the ſame time be able to diſpute the advantage of the wind with them; 4. that they may readily form the line as ſoon as they get under ſail; 5. that the ſhips may have room to keep clear of each other in getting under way, in order to which they ſhould be regularly anchored in one or many lines, about three cables length aſunder, and one hundred and twenty fathoms between each ſhip.

When a fleet is under a neceſſity of continuing at ſea in bad weather, it ſhould form itſelf into three columns, leaving a great interval between each ſhip, without at the ſame time widening the diſtance between the columns; ſo that it may be in this manner leſs liable to be ſeparated, and the ſhips in leſs danger of falling aboard each other.

If the ſhips have a good offing and ſea room enough to drive, they will lie-to under their courſes; which will ſubject them to labour leſs, and not ſtrain ſo much on their maſts, rigging, &c. but if they ſhould not have drift enough, they muſt lie-to under their main-ſails, or mizens only, which will ſtill keep them much eaſier than if they were under no ſail at all.

Laſtly, if a fleet deſigns to force into an harbour, wind, weather, &c. permitting, ſome ſhips ſhould be ordered to divert the out-forts, by coming to an anchor and placing themſelves in ſuch a manner as to bring their broadſides to bear upon them: when that is accompliſhed, the briſk and continued fire of a ſhip will greatly diſtreſs the enemy; but more eſpecially againſt ſtone-works, which fly about and do great execution, whilſt the main body of the fleet puſhes into harbour.

FLEETING, among ſailors, changing the ſituation of a tackle, when the blocks or pullies are drawn together: the uſe of fleeting is to ſeparate the powers which produce any great effort, that the force may be increaſed, which is deſtroyed by their meeting.

FLEMISH, or the Flemish-Tongue, is that which we otherwiſe call Low-Dutch, to diſtinguiſh it from the German, of which it is a corruption, and a kind of dialect. See German.

It differs from the Walloon, which is a corruption of the French language. The Flemiſh is uſed through all the provinces of the Netherlands.

Flemish Bricks, a neat, ſtrong, yellow kind of bricks, brought from Flanders, and commonly uſed in paving yards, ſtables, &c. being preferable for ſuch purpoſes to the common bricks. See Brick.

FLESH, *Caro*, in anatomy, a ſimilar fibrous part of an animal body, ſoft and bloody, being that of which moſt of the other parts are compoſed, and whereby they are connected together; or more properly, it is ſuch parts of the body where the blood-veſſels are ſo ſmall, as only to retain blood enough to preſerve their colour red.

Flesh, among botaniſts, is all the ſubſtance of any fruit that is between the outer rind and the ſtone; or that part of any root that is fit to be eaten.

Flesh-Colour. See Carnation.

FLEUR de Lisee, in heraldry, the ſame with flory. See the article Flory.

FLEXIBLE, in phyſics, a term applied to bodies capable of being bent or diverted from their natural figure or direction.

FLEXION, in anatomy, is applied to the motion by which the arm or any other member of the body is bent. It is alſo applied to the muſcles, nerves, &c.

FLEXOR, in anatomy, a name applied to ſeveral muſcles, which are ſo called from their office, which is to bend the part to which they belong, in oppoſition to the extenſors, which open or ſtretch them.

FLINT, *Silex*, in natural hiſtory, a ſemi-pellucid ſtone, compoſed of cryſtal debaſed with earth, of one uniform ſubſtance, and free from veins; but of different degrees of colour, according to the quantity of earth it contains, and naturally ſurrounded with a whitiſh cruſt.

Oil of Flints, a name given to the liquor obtained from a mixture of four ounces of calcined and powdered flints, with twelve ounces of ſalt of tartar; this being melted together in a ſtrong fire, runs into glaſs, which is to be powdered and ſet in a cellar, where it runs into an oil per deliquium.

FLOAT *of a Fiſhing-Line*, the cork or quill that floats or ſwims above water.

Float alſo ſignifies a certain quantity of timber bound together with rafters, athwart, and put into a river to be conveyed down the ſtream; and even ſometimes to carry burdens down a river.

Float-Boards, thoſe boards fixed to water-wheels of under-ſhot mills, ſerving to receive the impulſe of the ſtream; whereby the wheel is carried round. See the articles Wheel and Mill.

FLOATAGES, all things floating on the top of the ſea or any water; a word much uſed in the commiſſions of water-bailiffs.

FLOATINGS, in huſbandry, the drowning or watering of meadows.

Floating *of Cheeſe*, among houſewives, ſeparating the whey from the curd. See Cheese.

FLOOD, a deluge or inundation of waters. See the article Deluge.

FLOOKING, among miners, a term uſed to expreſs a peculiarity in the load of a mine. The load or quantity of ore is frequently intercepted in its courſe by the croſſing of a vein of earth or ſtone, or ſome different metallic ſubſtance; as in which caſe the load is moved to one ſide, and this tranſient part of the land is called a flooking.

FLOOR, in architecture, the under ſide of a room, or that part we walk on.

Floor, in ſhip-building, the bottom of a ſhip, or all that part on each ſide of the keel, which approaches nearer to an horizontal than a perpendicular ſituation; whence it is common to ſay, a ſharp floor, a flat floor, a long floor, &c. whence,

Floor-Timbers, are thoſe which are placed immediately acroſs the keel, upon which the bottom of the ſhip is framed, and the upper parts of the timbers are conſtructed. See Timber.

FLORAL, in general, ſomething belonging to a flower. See Flower.

Thus floral leaves are thoſe found only near flowers.

Floral Games, in Roman antiquity, annual games inſtituted in honour of the goddeſs Flora, which began to be celebrated on the fourth of the calends of May, or the twenty-eighth of April, and were continued to the calends, of firſt of May.

FLORID Style is that too much enriched with figures and flowers of rhetoric.

FLORILEGE, *Florilegium*, a name the Latins have given to what the Greeks call *ανθολογιον*, anthology. See the article Anthologion.

FLORIN is ſometimes uſed for a coin, and ſometimes for a money of account.

Florin, as a coin, is of different values, according to the different metals and different countries where it is ſtruck. The gold florins are moſt of them of a very coarſe alloy, ſome of them not exceeding thirteen or fourteen carrats, and none of them ſeventeen and a half. As to ſilver florins, thoſe of Holland are worth about 1 *s.* 8 *d.* thoſe of Genoa were worth $8\frac{1}{4}$ *d.* ſterling.

Florin, as a money of account, is uſed by the Italian, Dutch, and German merchants and bankers, but admits of different diviſions at different places: in Holland it is on the footing of the coin of that name, containing twenty ſtivers. At Franckfort and Nuremberg it is equivalent to 3 *s.* ſterling, and is divided into creutzers and pfinnings; at Liege it is equivalent to 2 *s.* 3 *d.* at Straſbourg, to 1 *s.* 8 *d.* in Savoy, to 11 *d.* at Genoa, to $8\frac{1}{4}$ *d.* and at Geneva, to $6\frac{1}{2}$ *d.* See the article Coin.

FLORINIANS, *Floriniani*, in church hiſtory, a ſect of heretics, of the ſecond century, ſo denominated from their leader Florinus, who made God the author of evil.

They are a ſpecies of the gnoſtics, but deny the judgment and reſurrection, and hold that our Saviour was not born of a virgin. They were alſo called borborites. See the article Borborites.

FLORIST, *Floriſta*, according to Linnæus, is an author, or botaniſt, who writes a treatiſe called Flora, comprehending only the plants and trees to be found growing naturally in any place. However, in the more common acceptation of the word, floriſt ſignifies a perſon well ſkilled in flowers, their kinds and cultivation. See the article Flower.

FLORY, Flowry, or Fleury, in heraldry, a croſs that has the flowers at the end circumflex and turning down, differing from the potence, inaſmuch as the latter ſtretches out more like that which is called patee. See the article Potency and Patee.

FLOS, or Flower, in botany. See the article Flower.

Flos, in chemiſtry, the moſt ſubtile part of bodies ſeparated from the groſs parts by ſublimation, in a dry form.

FLOSCULOUS, among botaniſts, an appellation given to compound flowers made up of a number of leſſer ones, all incloſed in the ſame common cup.

The plants with floſculous flowers make one of Tournefort's claſſes, called by Linnæus ſyngeneſia. See the articles BOTANY and SYNGENESIA.

FLOUR, the meal of wheat-corn, finely ground and ſifted. See MEAL.

FLOWER, *Flos*, among botaniſts and gardeners, the moſt beautiful part of trees and plants, containing the organs or parts of fructification. See the article FRUCTIFICATION.

The parts of a flower are the ovary or piſtil, the corolla or flower-petals, the ſtamina or chives, the empalement or calyx, the perianthium, pericarpium, and fruit. See the articles PISTIL, COROLLA, STAMINA, &c.

According to the number of petals, or flower-leaves, flowers are called monopetalous or one-leaved, dipetalous or two-leaved, tripetalous or three-leaved, &c. Flowers are again diſtinguiſhed into male, female, and hermaphrodite: the male flowers are thoſe containing ſtamina, without any piſtil or fruit, commonly called ſtamineous flowers. The female flowers are ſuch as contain the piſtil, which is ſucceeded with fruit; theſe are called fruitful or knitting flowers. The hermaphrodites are thoſe which contain the organs of both ſexes, viz. ſtamina and piſtils; and theſe are by far the moſt numerous.

From the different figures and diſpoſition of the flower-leaves of plants, Mr. Tournefort has eſtabliſhed a ſyſtem of botany; whereas that of Linnæus is chiefly founded on the number and diſpoſition of the ſtamina. See BOTANY.

Flowers were in great requeſt among the ancients: they adorned their temples, houſes, and even tombs with them; but their principal uſe ſeems to have been at entertainments, where the gueſts were always decked with flowers, and even the room ſtrewed with them.

Quincy tells us, that flowers, deſigned for medicinal uſe, ſhould be plucked when they are moderately blown, and on a clear day before noon: and that for conſerves, roſes muſt be taken in the bud.

For the method of preſerving ſpecimens of flowers, ſee the article HORTUS SICCUS.

Eternal FLOWER, the Engliſh name of the xeranthemum. See XERANTHEMUM.

Everlaſting FLOWER, the Engliſh name of the gnaphalium. See GNAPHALIUM.

FLOWER-FENCE, the Engliſh name of the poinciana. See POINCIANA.

FLOWER-DE-LUCE, the ſame with the iris. See IRIS.

Sultan-FLOWER, the ſame with the cyanus. See CYANUS.

Sun-FLOWER, the Engliſh name of the helianthus. See HELIANTHUS.

Trumpet FLOWER, the ſame with the bignonia. See BIGNONIA.

Wind-FLOWER, the ſame with the anemone. See ANEMONE.

FLOWERS, in chemiſtry. See the article FLOS.

FLOWER-DE-LIS, or FLOWER-DE-LUCE, in heraldry, a bearing repreſenting the lilly, called the queen of flowers, and the true hieroglyphic of royal majeſty; but of late it is become more common, being borne in ſome coats one, in others three, in others five, and in ſome ſemee, or ſpread all over the eſcutcheon in great numbers.

The arms of France are, three flowers de lis or, in a field azure.

FLOWING SHEET, in the ſea-language; the ſheets are ropes faſtened to the lower corners of the ſails, and they are ſaid to be flowing when the wind is fair or large, as it is termed by ſeamen, as the ſheets are at this time not drawn ſo tight as when the ſhips are cloſe hauled.

A ſhip is ſaid to have a flowing ſheet when the wind croſſes the line of her courſe at right-angles, that is to ſay, a ſhip ſteering north, with the wind at eaſt, has a flowing ſheet; for if ſhe were cloſe-hauled, ſhe would ſteer two points nearer the wind, viz. N. N. E. See the article CLOSE-HAULED.

FLOX, among dyers, ſignifies well cleaned wool, uſed to abſorb the colours of cochineal.

FLUENT, in fluxions, the flowing quantity, or that which is continually either increaſing or decreaſing, whether line, ſurface, ſolid, &c. See FLUXION.

It is eaſy to find the fluxions, where the fluents are given; but, on the contrary, it is very difficult to find the fluents of given fluxions.

FLUID, in phyſiology, an appellation given to all bodies, whoſe particles eaſily yield to the leaſt partial preſſure, or force impreſſed.

Some philoſophers make the following diſtinction in fluids; thoſe which flow or ſpread themſelves till their ſurfaces become level or horizontal, they call liquid; in contradiſtinction to flame, ſmoke, vapour, &c. which are alſo fluids, but do not acquire ſuch a ſurface. Thoſe which are capable of exciting in us the idea of moiſtneſs, as water, &c. they call humid, diſtinguiſhing them thereby from air, quickſilver, and melted metals. But theſe diſtinctions are quite unneceſſary in a philoſophical ſenſe; the ſurfaces of all fluids being level, or horizontal, when not prevented by the bodies about them: and humidity is only a relative quality; for though quickſilver will not moiſten or ſtick to a man's finger, it will to ſilver or gold. See FLAME, SMOKE, LIQUID, &c.

FLUOR, in phyſics, a fluid, or more properly, the ſtate of a body that was before hard or ſolid, but is now reduced by fuſion, or fire, into a ſtate of fluidity.

FLUOR, in mineralogy, implies a ſort of mineral concretion, frequently found amongſt ores and ſtones, in mines and quarries.

Fluor Albus, or **Whites**, in medicine, is a diſcharge of whitiſh gleety matter by the natural parts of the fair ſex. This humour iſſues ſometimes from the veſſels of the uterus, and ſometimes from the glands of the vagina. In the former caſe the diſcharge is ſuppreſſed during the time of the menſtrual courſes; in the latter, it ſubſiſts with them, and continues even in the time of pregnancy.

In both ſpecies of the diſeaſe the principal intention ought to be directed towards mending the habit of body, from ſome fault in which they derive their origin: but when the ſeat of the diſtemper is in the vagina, it will, however, require topical applications.

Wherefore, generally ſpeaking, it will be proper to begin the cure by giving a vomit, eſpecially with ipecacuanha wine; frequent purging is indicated, chiefly with rhubarb; which may by taken either in ſubſtance, with the addition of aromatics, and in ſome caſes of a little calomel now and then; or in the tincture of rhubarb in wine. And the laxity of the fibres requires aſtringents, particularly ſuch as have ſteel in their compoſition.

As to external or topical remedies, which I have ſaid are neceſſary, when the vagina is the ſeat of the diſeaſe; we ought carefully to avoid applying all ſuch as are powerful repellers of the peccant humours: for thoſe only are ſerviceable which deterge and heal the little ulcers of that membrane. For my part, I have often, with great ſucceſs, ordered the patient to inject a ſmall quantity of Bates's aqua aluminoſa, or of the camphorated vitriolic water, with a little Egyptian honey added to either, into the vagina through a proper ſyringe, at repeated times: and it will be of ſome ſervice to fumigate the vagina now and then with a powder made with equal parts of frankincenſe, maſtich, amber, and cinnabar of antimony, thrown on burning coals. *Mead's Monita Præcepta.*

FLUSH-DECK, or deck fluſh fore and aft, in ſhip-building, the upper deck of a ſhip, which has no riſing at either end, only the common curve, or gradual aſcent from the middle towards the ſtem and ſtern, called by ſailors the ſheer.

FLUTE, *fiſtula*, an inſtrument of muſic, the ſimpleſt of all thoſe of the wind kind. It is played on by blowing it with the mouth, and the tones or notes are changed by ſtopping and opening the holes diſpoſed for that purpoſe along its ſide. The ancient fiſtulæ, or flutes, were made of reeds, afterwards of wood, and laſt of metal: but how they were blown, whether as our flutes, or as hautboys, does not appear.

German **Flute**, is an inſtrument entirely different from the common flute. It is not, like that, put into the mouth to be played, but the end is ſtopt with a tompion, or plug; and the lower lip is applied to a hole about two inches and a half, or three inches diſtant from the end. This inſtrument is uſually about a foot and a half long; rather bigger at the upper end than the lower; and perforated with holes, beſides that for the mouth, the loweſt of which is ſtopped and opened by the little finger's preſſing on a braſs, or ſometimes, a ſilver key, like thoſe in hautboys, baſſoons, &c. It is found exceeding ſweet and agreeable, and ſerves as a treble in a concert.

Flutes, or **Flutings**, in architecture, perpendicular channels, or cavities, cut along the ſhaft of a column, or pilaſter. They are chiefly affected in the Ionic order, where they had their firſt riſe; though, indeed, they are uſed in all the richer orders, as the Corinthian and Compoſite; but ſeldom in the Doric, and ſcarce ever in the Tuſcan.

Each column has twenty-four flutes, and each flute is hollowed in exactly a quadrant of a circle; but the Doric has but twenty. Between the flutes are little ſpaces that ſeparate them, which Vitruvius calls ſtria, and we liſts: though, in the Doric, the flutes are frequently made to join to one another without any intermediate ſpace at all; the liſt being ſharpened off to a thin edge, which forms a part of each flute.

Sometimes the flutings are made flat, and are called facettes; but theſe have never ſuch a good effect as the others. Vitruvious ſays, that when there are flutings in the column, there ought alſo to be eggs and anchors in the quarter-round of the capital, and even pearls and olives, in a baguette, to be made underneath, inſtead of annulets. Theſe eggs and olives ought to be in the ſame number with the flutings, and to be regularly diſtributed.

FLUX, in medicine, an extraordinary iſſue, or evacuation, of ſome humours of the body.

Flux of the urine. See **Diabetes**.

Flux, in hydrography. See **Tide**.

Flux, in metallurgy, whatever can cauſe any body, otherwiſe not at all, or hardly, fuſible by fire, to melt.

Fluxes, ſays Dr. Shaw, ſeem reducible to two general kinds, viz. the vitreous and the ſaline. By the vitreous we underſtand all thoſe which either have of themſelves, or readily aſſume, a glaſſy form in the fire; among the principal of which are reckoned the glaſs of lead, the glaſs of antimony, and borax. By the ſaline kind of fluxes are underſtood all thoſe that are compoſed of ſalts, whether tartar, nitre, fixed alcali, or the like.

FLUXIONS, in the mathematics, according to their great inventor, are not magnitudes, but the velocities with which magnitudes (varying by a conſtant motion) increaſe or diminiſh; and the magnitudes thus generated are called the fluents of thoſe fluxions. This definition is, as nearly as could poſſibly be expreſſed, the ſubſtance of the author's own words, in the introduction to his quadrature

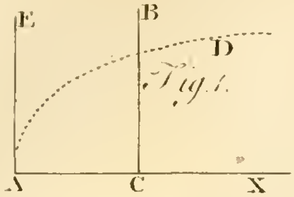


Fig. 1.

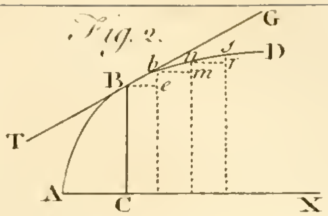


Fig. 2.

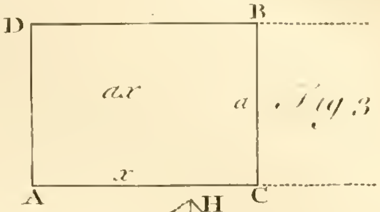


Fig. 3

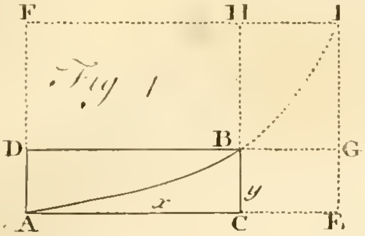


Fig. 4

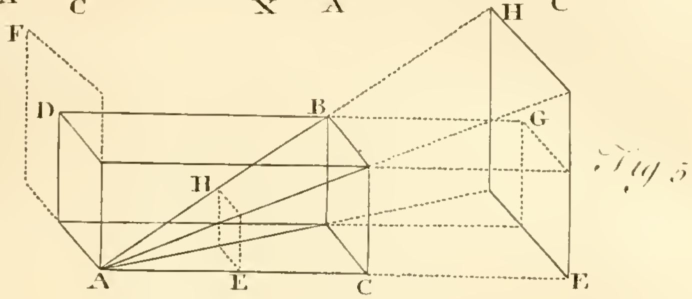


Fig. 5

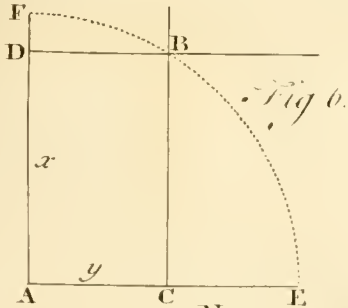


Fig. 6.

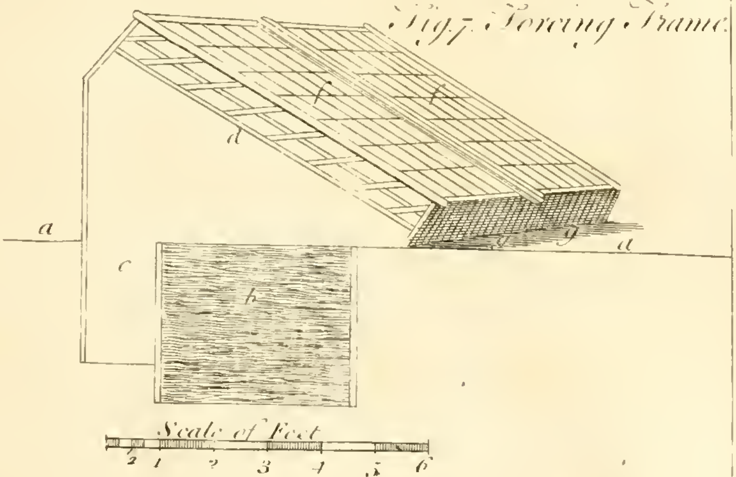


Fig. 7. Forcing Frame.

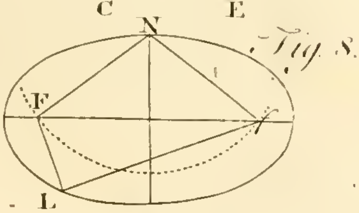


Fig. 8.

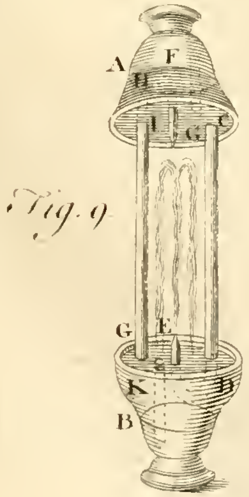


Fig. 9.

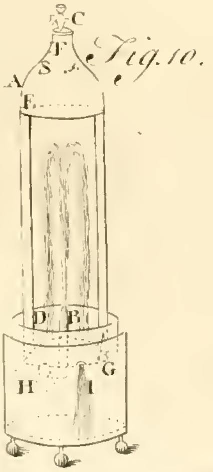


Fig. 10.

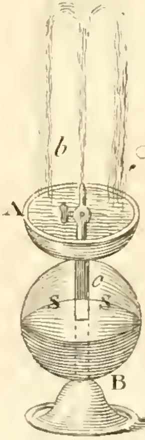


Fig. 11.

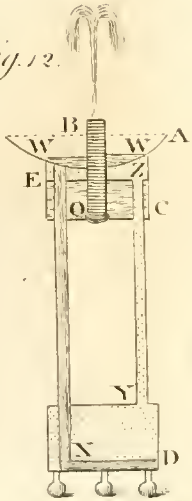


Fig. 12.

T. Lodge Sculp.

drature of curves, where he ſays, “ I conſider mathematical quantities, in this place, not as conſiſting of very ſmall parts, but as deſcribed by a continued motion. Lines are deſcribed, and thereby generated, not by the appoſition of parts, but by the continued motion of points; ſuperficies by the motion of lines, &c. therefore, conſidering that quantities which increaſe inequal times, and by increaſing are generated, I ſought a method of defining quantities from the velocities of the motions, or increments with which they are generated, and calling theſe velocities of the motions, or increments, fluxions, and the generated quantities, fluents, &c.” We have been the more particular in this definition that we might avoid the ill-natured criticiſms of little pretenders to ſcience; for we have very lately ſeen an author, of the moſt diſtinguiſhed merit, treated in a very ſcurrilous manner for a ſmall deviation therefrom, notwithſtanding he has, by that means, conveyed the idea of a fluxion in a much more plain manner than had before been done; and, at the ſame time, no error could poſſibly ariſe in the application by conſidering them in that manner.

As the doctrine of fluxions is the moſt noble and comprehenſive of all the mathematical ſciences (for it may not improperly be called a ſcience of itſelf) we ſhall, as we have done of the others, firſt give a ſhort hiſtory of its riſe and improvements, and the rather, as the invention has been claimed by two perſons; in which we ſhall endeavour to demonſtrate, that Sir Iſaac Newton was the real and only inventor, and that Mr. Leibnitz only made ſome ſlight and trivial alterations from the hints he, from time to time, received from Mr. Oldenburgh, and the inventor himſelf; and ſecondly, explain the method itſelf, in the moſt plain and comprehenſive manner poſſible.

Dr. Wallis, in his *Opus Arithmeticum*, publiſhed in 1657, cap. 33. prop. 68. reduced the fraction $\frac{A}{1-R}$ by a continual diviſion into the ſeries $A+AR+AR^2+AR^3+AR^4+$, *&c.* Lord viſcount Brounker ſquared the hyperbola by this ſeries, $\frac{1}{1\times 2}+\frac{1}{3\times 4}+\frac{1}{5\times 6}+\frac{1}{7\times 1}+$, *&c.* that is, by this $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\frac{1}{5}-\frac{1}{6}+\frac{1}{7}-\frac{1}{8}+$, *&c.* conjoining each two terms into one; which was publiſhed in the Philoſophical Tranſactions for April 1668.

Soon after, M. Mercator publiſhed a demonſtration of this quadrature by Dr. Wallis’s diviſion; and not long after that, Mr. James Gregory gave a geometrical demonſtration thereof; and theſe books were, a few months after, ſent by Mr. John Collins to Dr. Barrow at Cambridge, and by Dr. Barrow communicated to Mr. Newton in June 1669, then a fellow of Trinity college; whereupon Dr. Barrow ſent Mr. Collins, in return, a tract of Mr. Newton’s, entitled, *Analyſis per æquationes numero terminorum infinitas*, and contains a general method of doing that in all curves, which lord Brounker and M. Mercator did in the hyperbola alone; and though the latter lived upwards of ten years after, yet he never proceeded any farther than to the ſingle quadrature of the hyperbola: the progreſs made by Mr. Newton as to all curves in general ſhews, that he did not want M. Mercator’s aſſiſtance; however, to avoid cavilling, he allows that both lord Brounker had invented, and M. Mercator demonſtrated the ſeries for the hyperbola ſome years before they publiſhed it, and conſequently before he himſelf had found out his general method.

This treatiſe is likewiſe mentioned by Mr. Newton himſelf, in a letter to Mr. Oldenburgh, dated October 24, 1676; alſo by ſeveral letters written by Mr. Collins to Mr. James Gregory in Scotland, Mr. Berlet and Mr. Vernon at Paris, as well as to ſeveral Engliſh gentlemen, viz. Mr. Strode, Mr. Oldenburgh, Mr. Dary, &c. Theſe letters are dated in the years 1669, 1670, 1671, and 1672. Numberleſs other proofs might be brought to demonſtrate that Mr. Newton had found out this method of determining the area of all ſorts of curves and their rectification, together with the ſuperficies and contents of ſolids from given right-lines, and *vice verſa*, as he expreſſes himſelf in his above-mentioned letter to Mr. Oldenburgh, which he calls a compendium of theſe ſeries.

Mr. Newton, in a letter to Mr. Oldenburgh, dated June 13, 1676, ſhewed, in a general manner, how to reduce any power of a binomial into a converging ſeries; and alſo how, by that ſeries, to ſquare that curve whoſe ordinate is that power: therefore, by aſſuming, as is demonſtrated by Dr. Wallis in his Arithmetica Infinitorum, that if the abſceſſa of any curve be x, m and n any integers, and the ordinate, at right-angles to the abſceſſa, be $x^{\frac{m}{n}}$ the area of the figure will be $\frac{n}{m+n}\,x^{\frac{m+n}{n}}$; he had a general expreſſion for the area of all curves of that kind. This letter was communicated by Mr. Oldenburgh to Mr. Leibnitz, and Mr. Leibnitz afterwards deſired a farther explanation of it, which was ſent him in a letter dated October 24, following, from which it is plain that Mr. Leibnitz was ſo far from having invented any thing of this kind, that he did not, from the Compendium contained in that letter, fully underſtand it.

Moreover, Mr. Newton, in his above-mentioned Compendium, amongſt many other examples, ſets down this: Let the radius of a circle be 1, the arch z, and the ſine x; the equations for finding the arch whoſe ſine is given, and for finding the ſine whoſe arch is given, will be

$$z=x+\tfrac{1}{6}x^3+\tfrac{3}{40}x^5+\tfrac{5}{112}x^7,\ \&c.$$
$$x=z-\tfrac{1}{6}z^3+\tfrac{1}{120}z^5-\tfrac{1}{5040}z^7+,\ \&c.$$

Mr. Collins informed Mr. Gregory of this method in autumn 1669, and Mr. Gregory, by the help of one of Mr. Newton's ſeries, after a year's ſtudy, found out the method in December, 1670; and two months after, in a letter dated Feb. 15, 1671, ſent ſeveral theorems, diſcovered thereby, to Mr. Collins, with leave to communicate them freely; and Mr. Collins was very free in communicating whatever he received either from Mr. Newton or Mr. Gregory, as appears by his letters printed in the *Commercium*; amongſt the Series Mr. Gregory ſent in the ſaid letter, were theſe two; let the radius of a circle be r, the arch a, and the tangent t, the equations for finding the arch whoſe tangent is given, and the tangent whoſe arch is given, will be theſe:

$$a = t - \frac{t^3}{3r^2} + \frac{t^5}{5r^4} - \frac{t^7}{7r^6} +, \text{ \&c.}$$

$$t = a + \frac{a^3}{3r^2} + \frac{2a^5}{15r^4} + \frac{17a^7}{315r^6} +, \text{ \&c.}$$

In the year 1671, M. Leibnitz publiſhed two tracts at London, the one dedicated to the Royal Society, and the other to the Academy of Sciences at Paris; and in the dedication of the firſt he mentioned his correſpondence with Mr. Oldenburgh: in Feb. $167\frac{2}{3}$, M. Leibnitz, meeting with Dr. Pell at Mr. Boyle's, pretended to the differential method of Mouton; and notwithſtanding Dr. Pell ſhewed him, that it was Mouton's method, he perſiſted in maintaining it to be his own invention, pretending that he had found it himſelf, without knowing what Mouton had done before, and that he had improved it much. When one of Mr. Newton's Series was ſent to Mr. Gregory, he tried to deduce it from his own Series combined together, as he mentions in his letter, dated Dec. 19, 1670; and by ſome ſuch method M. Leibnitz, before he left London, ſeems to have found the ſum of a Series of fractions decreaſing *in infinitum*, whoſe numerator is a given number, and the denominators triangular, pyramidal, or triangulo-triangular numbers, &c.

About the latter end of February or beginning of March $167\frac{2}{3}$, M. Leibnitz went from London to Paris, and continued his correſpondence with Mr. Oldenburgh to the following June; then he learned algebra and the higher geometry; and in July 1674 he renewed his correſpondence with Mr. Oldenburgh and Mr. Collins, and he wrote, that he was maſter of a wonderful theorem, which gave accurately the area of a circle, or any ſector thereof, in a ſeries of rational numbers; and in October following, that he had found the circumference of a circle, in a ſeries of very ſimple numbers, and that by the ſame method (ſo he calls the ſaid theorem) any arch, whoſe ſine was given, might be found in a like ſeries, though the ratio to the whole circumference were not known; his theorem, therefore, amounted to the finding any ſector or arch, whoſe ſine was given; if the ratio of the arch to the whole circumference was not known, the theorem or method gave him only the arch; if it was known it alſo gave him the whole circumference; and therefore it was the firſt of Mr. Newton's two theorem's above-mentioned; but M. Leibnitz did not then know the demonſtration of this theorem; for, in his letter of May 12, 1676, he deſired Mr. Oldenburgh to procure the demonſtration from Mr. Collins, meaning the method by which Mr. Newton had invented it.

In a letter of Mr. Collins's, dated April 15, 1675, Mr. Oldenburgh ſent Mr. Leibnitz eight of Mr. Newton's and Mr. Gregory's ſeries, amongſt which were Mr. Newton's two ſeries above-mentioned, for finding the arch, whoſe ſine is given, and the ſine whoſe arch is given; and Mr. Gregory's two ſeries above-mentioned, for finding the arch whoſe tangent is given, and the tangent, whoſe arch is given; and Mr. Leibnitz, in his anſwer, dated May 20, 1675, acknowledged the receipt of this letter, and promiſed to compare them with thoſe of his own invention, which he ſeemed to intimate had been invented many years before, but never took any farther notice of it, except to inform the public (in the Acta Eruditorum, for April, 1691) that he had invented ſomething like it on that ſubject in the year 1675, at which time he had found out the demonſtration of one of thoſe ſeries, and wrote to Mr. Oldenburgh to procure him Mr. Newton's demonſtration of the others; this Mr. Newton did in a letter dated June 13, 1676, and which was ſent to him at Paris, June 26, together with a manuſcript, containing Extracts from Mr. James Gregory's Letters, who was now dead, and which contained all, or the greateſt part, of his inventions of that kind, and which appears farther by Mr. Leibnitz's and Mr. Tſchirnhauſe's anſwers concerning them.

M. Leibnitz's anſwer, directed to Mr. Oldenburgh, and dated Auguſt 27, 1676, begins thus, "Your letter, dated July 26, contains ſeveral, and thoſe more extraordinary things in analyſis, than a great many voluminous books publiſhed on this ſubject; wherefore, I thank both you, Mr. Newton, and Mr. Collins for communicating to me ſo many curious things;" and towards the end of the letter, after he had done with the contents of Mr. Newton's letter, he proceeds thus; "I come now to other things contained in your letter, which the learned Mr. Collins was pleaſed to communicate; I wiſh he had added the demonſtration of Mr. Gregory's linear approximation, for he certainly had a genius for promoting ſuch ſpeculations:" And M. Tſchirnhauſe's anſwer, dated September 1, 1676, after he had done with Mr. Newton's letter about ſeries, concludes thus, "and what that excellent geometrician Mr. Gregory has done in this matter are certainly extraordinary; and indeed ſuch as ſhall cauſe his MSS to be publiſhed, ſhall do the greateſt ſervice to his reputation:" In the firſt part of this letter, where M. Tſchinhauſe ſpeaks of Mr. Newton's ſeries, he ſays, he looked over them curſorily, to ſee if he could find M. Leibnitz's ſeries for ſquaring the circle, or hyperbola; but if he had ſearched for it in the extracts of Mr. Gregory's letters, he might have found it in the abovementioned letter of February 15, 1671; for, the MS. of thoſe extracts, with that letter therein, is ſtill extant in the hand-writing of Mr. Collins.

And though M. Leibnitz had now received this ſeries twice from Mr. Oldenburgh, yet in his letter of Auguſt 27, 1676, he ſent it back to him by way of recompence for Mr. Newton's method, pretending, he had communicated it to his friends at Paris three years before, and upwards; that is, two years before he received it in Mr. Oldenburgh's letter of April 15, 1675; at which time he did not know it to be his own, as appears by his anſwer of May 20, 1675, abovementioned: he might receive this ſeries at London, and communicate it to his friends at Paris above three years before he ſent it back to Mr. Oldenburgh; but it does not appear, that he had the demonſtration thereof ſo early; which when he had found out, he then exhibited in his Opuſculum, and communicated it to his friends, and he himſelf has told us, that this was in 1675: however, it lies upon him to prove, that he had this ſeries, before he received it from Mr. Oldenburgh; for, in his anſwer to Mr. Oldenburgh he did not know any of the ſeries, then ſent him, to be his own; and he concealed from the gentlemen at Paris his having received it from Mr. Oldenburgh, with ſeveral other ſeries, and his having ſeen a copy of the letter, in which Mr. Gregory had ſent it to Mr. Collins in the beginning of the year 1671: in the ſame letter of Auguſt 27, 1676, after M. Leibnitz had deſcribed his quadrature of the circle, and equilateral hyperbola, he adds; " again from the ſeries of regreſſions I found the following for the hyperbola, *viz.* if any number be leſs than unity, as $1 - m$, and its hyperbolic logarithm be l, m will be $= \frac{l}{1} - \frac{l^2}{1\times2} + \frac{l^3}{1\times2\times3} - \frac{l^4}{1\times2\times3\times4} +$, &c. if the number be greater than unity, as $1 + n$, then, for finding it, I have likewiſe diſcovered the rule, expreſſed in Mr. Newton's letter, viz. n will be $= \frac{l}{1} + \frac{l^2}{1\times2} + \frac{l^3}{1\times2\times3} + \frac{l^4}{1\times2\times3\times4} +$, &c. — and as to the regreſſion from arches, I directly lighted upon the rule that from the given arch gives the co-ſine; viz. the co-ſine $= 1 - \frac{a^2}{1\times2} + \frac{a^4}{1\times2\times3\times4} -$, &c. but afterwards I likewiſe found, that from this rule might be demonſtrated that other communicated to me for finding the right ſine, which is $\frac{a}{1} - \frac{a^3}{1\times2\times3} + \frac{a^5}{1\times2\times3\times4\times5} -$, &c. Thus M. Leibnitz put in his claim for the co-invention of theſe four ſeries, though the method of finding them was ſent him at his own requeſt, which yet he could not underſtand; for, in the ſame letter of Auguſt 27, 1676, he deſired Mr. Newton to explain it farther, his words are as follows; " but I want Mr. Newton ſhould explain ſome things farther; as the origin of the theorem he firſt lays down; the method, by which in his operations, he found the quantities p, q, r; and in fine, how he proceeds in the method of regreſſions, as when from the logarithm the number is ſought; for, he does not explain how that is deduced from his method."

He pretended to have found two ſeries for the number whoſe logarithm was given, and yet in the ſame letter he deſired Mr. Newton to explain the method of finding thoſe very two ſeries.

When Mr. Newton received this letter, he wrote back, that he had already communicated to him all the ſaid four ſeries, the two former being one and the ſame ſeries, putting the letter l for the logarithm with its ſign + or —; and the third the exceſs of the radius above the verſed ſine, for which a ſeries had been formerly ſent him; upon this, M. Leibnitz deſiſted from his claim: beſides, Mr. Newton in the ſame letter, dated October 24, 1676, farther explained his methods of regreſſion, as M. Leibnitz had deſired; and yet M. Leibnitz in his letter of June 21, 1677, deſired a farther explication; but ſoon after, upon reading Mr. Newton's letter a ſecond time, he wrote back July 12, 1677, that he now underſtood what he wanted, and found by his papers, that he had formerly uſed one of Mr. Newton's methods of regreſſion; but as in the example which he then chanced to uſe, there was nothing elegant, he had, out of his uſual impatience, neglected to uſe it any farther: he had, therefore, ſeveral direct ſeries, and, conſequently, a method of finding them, before he invented the inverſe method, but afterwards forgot it; and if he had ſearched his old papers more diligently, he thinks he might alſo have found this method there, but having forgot his own methods, he wanted Mr. Newton's.

A copy of a letter of Mr. Newton's, dated December the 10th, 1672, was likewiſe ſent to M. Leibnitz by Mr. Oldenburgh, amongſt Mr. James Gregory's papers, at the ſame time with Mr. Newton's letter of June 13, 1676. And Mr. Newton having mentioned in theſe two letters, that he had a very general analyſis, partly conſiſting of the method of converging ſeries, and partly of another method, whereby he applied thoſe ſeries to the ſolution of almoſt all problems, (excepting perhaps ſome numeral ones, like thoſe of Diophantus) and found out the tangents, area's, lengths, ſolid contents, centres of gravity and curvities of curves, and curvilinear figures, either geometrical or mechanical, without ſticking at ſurds; and that Sluſius's method of tangents was but a branch or corollary of this other method; M. Leibnitz, having ſeen theſe in his return home through Holland, was then only meditating the improvement of Sluſius's method; for, in a letter to Mr. Oldenburgh, dated from Amſterdam, November $\frac{18}{28}$, 1676, he wrote thus; “ the method of tangents, publiſhed by Sluſius, does not reach ſo far but that ſomething farther might be done in that kind, that would be of very great uſe in all ſorts of problems, even in my method (without extractions) of reducing equations to ſeries; to wit, a certain ſhort table of tangents might be calculated and continued ſo far, till its progreſſion appear, ſo that any one might continue it as far as he pleaſed, without any calculation.” This was the improvement of Sluſius's method into a general one, which M. Leibnitz was then meditating, and by his words, ſomething farther might be done in that kind, that would be of very great uſe in all ſorts of problems; but the improvement by the differential Calculus was not yet thought of, for that muſt be referred to the following year.

Mr. Newton in his next letter, dated October 24, 1676, mentioned the Analyſis, communicated by Dr. Barrow to Mr. Collins in 1669, and alſo another tract written in 1671, about converging ſeries, and about the other method, whereby tangents were drawn according to that of Sluſius, and the Maxima and Minima determined, and the quadrature of curves made more eaſy, and this without ſticking at radicals; and by which all ſeries were invented, which in certain caſes broke off, and gave the quadrature of curves in finite equations, when it might be done; and he comprehended the foundation of theſe operations in this ſentence, expreſſed enigmatically as above, “ having an equation given that involves any number of flowing quantities to find their fluxions, and *vice verſâ*:” which puts it paſt all diſpute, that he had invented the method of fluxions before that time; and if other things in that letter be conſidered, it will appear, that he had then brought it to great perfection, and made it exceeding general; ſince the propoſitions in his book of quadratures, and the methods of converging ſeries, and of drawing a curve line through any number of given points, were then known to him; for, when the method of fluxions does not proceed in finite equations, he reduces the equations into converging ſeries by the binomial theorem, and by the extraction of fluents out of equations, either involving, or not involving their fluxions; and when finite equations are wanting, he deduces converging ſeries from the conditions of the problem, by aſſuming the terms of the ſeries gradually, and determining them by thoſe conditions; and when fluents are to be deduced from fluxions, and the law of the fluxions is wanting, he finds that law very nearly, by drawing a parabolic line through any number of given points; and by theſe improvements Mr. Newton had in thoſe days made his method of fluxions much more univerſal than the differential method of M. Leibnitz is at preſent: this letter of Mr. Newton's, dated October 24, 1676, was ſeen by M. Leibnitz at London in the latter end of the winter, or beginning of the ſpring following, and he had a copy of it at Hanover the beginning of the enſuing ſpring; and M. Leibnitz ſoon after replied in a letter, dated June 21, 1677; “ I agree with Mr. Newton, that Sluſius's method of tangents is ſtill imperfect; and I have long ago handled the ſubject more generally, *viz.* by the differences of the ordinates.” Hence, for the future, calling dy the difference of the two neareſt y, &c. Here at length M. Leibnitz firſt began to propoſe his differential method, and there is not the leaſt evidence, that he knew it before the receipt of Mr. Newton's laſt letter; he ſays indeed, “ that he had a long time ago handled the ſubject of tangents more generally, *viz.* by the differences of the ordinates;” and ſo he had affirmed before in other letters, that he had invented ſeveral converging ſeries, both direct, and inverſe, before he had any method of inventing them; and had forgot an inverſe method of ſeries before he perceived its uſefulneſs; but no man is allowed a witneſs in his own cauſe, and therefore it lies upon M. Leibnitz's friends to prove, that he found out this method before the receipt of Mr. Newton's letters; and if they cannot prove this, the queſtion, who was the firſt inventor of the method, is decided.

In November 1684, M. Leibnitz publiſhed the elements of this differential method in the Acta Erudit. which he illuſtrated with examples of drawing tangents, and determining Maxima and Minima, and then added; “ and theſe indeed, are the rudiments of a certain kind of ſublimer geometry, that reaches even to the moſt difficult, and curious problems of mixed mathematics, and which, without the differential calculus, or ſome ſuch method, are not readily to be attempted.” The words, ſome ſuch method, plainly relate to Mr. Newton's; and that whole period contains nothing more than what Mr. Newton had affirmed of his general method in his letters of 1672 and 1676. And in the Acta Erudit. of June 1686, p. 297. M. Leibnitz added, “ I chooſe rather to make uſe of dx and the like than of ſingle letters, in their ſtead, becauſe dx is a certain kind of modification of x itſelf, &c.” He knew very well that in this method he might conveniently enough have uſed ſingle letters with Dr. Barrow, but he choſe rather to uſe the new ſymbols dx and dy, though nothing can be done by them, but what with more conciſeneſs and advantage may be done by ſingle letters.

The next year Mr. Newton's Principia Philoſoph. came out, a book full of ſuch problems, as M. Leibnitz called the moſt difficult and curious, &c. And the Marquis De l'Hoſpital ſpeaks thus of it; “ it is almoſt entirely compoſed by this calculus:” and

M. Leibnitz himſelf in a letter to Mr. Newton, dated from Hanover, March $\frac{7}{17}$, 1693, and ſtill extant in his own hand-writing, and exhibited to the Royal Society, acknowledged the ſame thing in theſe words; "you had ſurpriſingly enlarged geometry by your ſeries, but by your Principia you have ſhewn, that you have penetrated into what was beyond the reach of the common analyſis; I have likewiſe attempted, by making uſe of proper ſymbols to expreſs the ſums and differences, to reduce in ſome meaſure to analyſis, that geometry I call the tranſcendental, and I have not been unſucceſsful."

The celebrated Dr. Wallis had received copies of Mr. Newton's two letters of June 13, and October 24, 1676, from Mr. Oldenburgh, and had publiſhed ſeveral things out of them in his algebra; ſoon after which he was adviſed to print the letters entire, becauſe Mr. Newton's method of fluxions began to paſs in Holland with great applauſe, under the title of Mr. Leibnitz's Method of Differentials, he therefore took notice of this in the preface to the firſt volume of his works, publiſhed in 1695; and in a letter to Mr. Leibnitz, he informs him of his reaſons for ſo doing, which, though couched in pretty plain terms, Mr. Leibnitz never thought proper to contradict, or complain of, until after the doctor's deceaſe, though in the Acta Eruditorum, for June, in the following year, he complains that the Dr. had not informed the public that he was maſter of the Calculus, when thoſe letters paſſed between Mr. Oldenburgh and him.

This was the ſtate of the diſpute when Dr. Wallis died, which was in October, 1703. Till this time, Mr. Leibnitz pretended to nothing more than that he invented the method apart, without any aſſiſtance from Mr. Newton; he allowed that Mr. Newton was the older inventor, but Dr. Wallis being the laſt of the old mathematicians, who knew any thing of the beginning of the diſpute, and he happily ſilenced, Mr. Leibnitz thought it a fair opportunity for putting in a farther claim, and, therefore, when Mr. Newton publiſhed his Treatiſe on the Quadrature of Curves, in 1704, Mr. Leibnitz, in the Acta Erudit. of January, 1705, in giving an account of this book, repreſented, that he was the firſt inventor of that method, and that Sir Iſaac had only ſubſtituted fluxions for differences. This gave riſe to the famous diſpute between Mr. Keill and him; for Mr. Keill, in a letter publiſhed in the Philoſophical Tranſactions, 1708, retorted the accuſation, aſſerting that "Mr. Newton was, beyond all diſpute, the firſt inventor of the arithmetic of fluxions, as would eaſily appear to any one that reads his letters, publiſhed by Dr. Wallis; though the ſame method, by only changing the name and manner of notation, was afterwards publiſhed by M. Leibnitz in the Acta Erudit."

Before Mr. Newton ſaw what had been publiſhed in the Acta Erudit. he expreſſed himſelf offended at the printing of this paragraph of Mr. Keill's letter, leaſt it ſhould cauſe a diſpute; and M. Leibnitz, putting a worſe conſtruction on it than Mr. Keill intended, complained of it as a calumny in a letter to Dr. Sloane, dated March 4, 1711, N. S. and moved, that the Royal Society would cauſe Mr. Keill to make a public recantation: but Mr. Keill inſiſted he would prove and defend what he had written; and Mr. Newton, upon being ſhewn the accuſation in the Acta Erudit. gave him leave ſo to do; but M. Leibnitz, in a ſecond letter to Dr. Sloane, dated December 29, 1711, inſtead of making good his accuſation, as he was bound to do, that it might not be deemed a calumny, inſiſted only upon his own candour, as if it would be injuſtice to queſtion it; and refuſed to tell how he came by the method; and ſaid that the Acta Erudit. had given every man his due, and that he had concealed the invention upwards of nine years (he ſhould have ſaid ſeven years) that no body might pretend (he means that Mr. Newton might not pretend) to have been before him in it; and called Mr. Keill a novice, unacquainted with things paſt, and one that acted without authority from Mr. Newton, and a clamorous man who deſerved to be ſilenced, and deſired, that Mr. Newton himſelf would give his opinion in the matter: he knew, that Mr. Keill affirmed nothing more than what Dr. Wallis had publiſhed thirteen years before, without being then contradicted: he knew, that Mr. Newton had given his opinion in this matter in the introduction to his book of quadratures, publiſhed before this controverſy began; but Dr. Wallis was now dead; the ſurviving mathematicians in England are reckoned novices; M. Leibnitz would aſſume to himſelf to queſtion any man's candour without injuſtice, and Mr. Newton, unleſs he would either diſſemble or deny the matter, muſt be involved in wrangling and diſputes.

The Royal Society, therefore, having as much authority over M. Leibnitz, as over Mr. Keill, as being two of their members, and being now twice preſſed by M. Leibnitz to interpoſe, and thinking it unjuſt either to condemn, or cenſure Mr. Keill without enquiring into the matter; and knowing, that neither Mr. Newton, nor M. Leibnitz (the only perſons alive who knew and remembered any thing of what had paſſed in theſe matters forty years before) could be witneſſes for, or againſt Mr. Keill, appointed a numerous committee to ſearch old letters and papers, and report their opinion upon what they ſhould find; and as ſoon as this report was made, they ordered the letters and papers, with the report of their committee, to be publiſhed; and by theſe letters and papers it appeared, that Mr. Newton had the method in or before the year 1669, and that M. Leibnitz had it not before the year 1677.

So much for the hiſtorical part of this curious article.—We ſhall now proceed to deliver the principles thereof as briefly as a ſubject of ſo intricate a nature will permit. And firſt,

A fluxion, according to our definition, is the velocity with which any quantity, at any given point or term of it, flows; that is, increaſes or decreaſes.

Thus, if we ſuppoſe the indefinite right-line AE (plate LV. *fig.* 1.) to move with a parallel motion along the axis AX, or ſo as always to be parallel to its firſt ſituation; and, at the ſame time, ſuppoſe a point to move from A, along the ſaid line AE, ſo as to generate or always to be in the curve AD: then, the velocity with which the end or point A, of the line AE, arrives at any point C, or, which is the ſame, the velocity with which the axis flows or is generated at any particular point C, is the fluxion of the abſciſs AC at that point: the velocity with which the point moves along the line AE at any point B, is the fluxion of the ordinate at that point: and, the velocity with which the point generates or moves along the curve at any particular point B, is the fluxion of the curve at that point. So likewiſe, the velocity with which the curvilineal ſpace ACB flows, or is generated by the line AE, at any term CB, is the fluxion of the ſaid curvilineal ſpace at that time.

Now, if the velocity with which any quantity flows, or is generated, be at every point or term the ſame; that is, if it be neither accelerated or retarded; the fluxion of it will likewiſe be at every point or term the ſame: but, if this velocity be continually increaſed or diminiſhed, then there will be a certain degree of velocity, or fluxion, peculiar to every point or term of the thing deſcribed: and the velocity wherewith the given velocity, at any point or term, is either accelerated or retarded, is called the fluxion of the fluxion, or the ſecond fluxion. And, again, if this acceleration or retardation be not uniform, but is increaſed with different degrees of proportion at different points or terms, then the velocity or ſwiftneſs of this acceleration or retardation, is called the third fluxion. And ſo on.

Increment, is the indefinitely ſmall increaſe of a quantity, generated in an indefinitely ſmall particle of time.

Thus, if we ſuppoſe *bc* (*fig.* 2.) indefinitely near and parallel to the ordinate BC, and B*e* parallel to the abſciſs AC; then C*c*, or its equal B*e*, will be the increment of the abſciſs AC; *eb* the increment of the ordinate CB; B*b* the increment of the curve AB; and CB*bc* the increment of the curvilineal ſpace ABC.

Now, if *nd* be ſuppoſed indefinitely near and parallel to *bc*, and *bm* equal and parallel to B*e* or *cd*, then the difference between *eb* and *mn*, is called the increment of the increment, or the ſecond increment; i. e. the increment of *eb*, or ſecond increment of CB. And, again, if *sf* be ſuppoſed indefinitely near and parallel to *nd*, and *nr* equal and parallel to *bm* or *df*, then the difference between the ſecond increment, and the difference of *mn* and *rs*, is called the third increment of CB. And ſo on.

Note, when a quantity, inſtead of increaſing, is continually diminiſhed, then the indefinitely ſmall particles, by which it is leſſened, are not increments, but decrements; and both increments and decrements are ſometimes called moments.

Now, if we ſuppoſe the abſciſs AC to flow on with an uniform motion, or equal parts of it to be deſcribed in equal times, its increment will accurately expreſs, or be exactly as its fluxion; ſince velocity is always as the ſpace uniformly deſcribed in a given time: and if the curve B*b* did exactly coincide with the tangent or right-line TBG, it is evident, that then, the increments B*b* and *be*, would likewiſe be deſcribed with uniform motions, and with the ſame degrees of velocity with which the curve and ordinate reſpectively flow at the point B; that is, the increments B*b* and *be*, would then be accurately as the fluxions of the curve and ordinate at the point B. But, ſince not two points of the curve are coincident with the tangent, and therefore the velocities with which the increments are generated, are continually varying in every point; ſo, therefore, the increments and fluxions are not in an exact proportion to each other; or, the increments do not accurately meaſure the velocities or fluxions with which they begin to be generated. However, as the point *b* is continually nearer to a coincidence with the tangent BG, the nearer it approaches the point of contact B; ſo, therefore, if we conceive the ordinate C*b*, to move back, till it coincides with CB; then, the very firſt moment before its coincidence, the curve B*b* and right-line BG, will be infinitely, or rather indefinitely near to a coincidence with each other; and conſequently, in that caſe, the increments B*b* and *be* will come indefinitely near to meaſure the fluxions of the curve and ordinate, or the velocities with which they reſpectively flow at the point B. Or, becauſe the particles of time in which any increments are generated, are ſuppoſed to be indefinitely ſmall, and conſequently the acceleration or retardation of the velocity with which they are generated muſt be ſo too; therefore, they are indefinitely near in proportion to the fluxions of the quantities of which they are increments: but, when the ratio from that of equality, is but indefinitely ſmall, or leſs than can be aſſigned, it may be conſidered as equal; and therefore, the increments may be taken as proportional to, or (becauſe velocity is expreſſed by the ſpace uniformly deſcribed in a given time) for the fluxions in all operations; and, on the contrary, the fluxions for the increments.

Note, thoſe quantities which are ſuppoſed to flow, or to be generated by continual increaſe, are called,

called fluents, and variable or flowing quantities: and thoſe which admit of no variation (as the parameter of a parabola, the diameter of a circle, &c.) are called permanent, given, and invariable quantities.—The beginning of the alphabet, viz. a, b, c, d, &c. is uſed to expreſs invariable quantities; and the end, viz. z, y, x, &c. variable or flowing quantities: and the fluxions of thoſe variables, viz. z, y, x, &c. are reſpectively denoted by $\dot{z}$, $\dot{y}$, $\dot{x}$, &c. and their ſecond fluxions, or the fluxions of $\dot{z}$, $\dot{y}$, $\dot{x}$, &c. by $\ddot{z}$, $\ddot{y}$ $\dot{x}$, &c. their third fluxions, or the fluxions of $\ddot{z}$, $\ddot{y}$, $\ddot{x}$, &c. by $\dddot{z}$, $\dddot{y}$, $\dddot{x}$, &c. and ſo on. Alſo, the moment, increment, or decrement, of z, is denoted by z', of y by y', of x by x' &c. and the ſecond moments, increments, or decrements of z, y, x, &c. or the moments, increments, or decrements of z', y', x', &c. by z'', y'', x'', &c. and ſo on.—The fluxions, increments, &c. of invariable quantities, viz. of a, b, c, d, e, &c. are $=o$.

Thoſe fluents which are ſuppoſed to be generated in the ſame time, or in equal times, are called contemporary fluents; and the fluxions of theſe contemporary fluents, are called contemporary fluxions. Now, it is evident, if two or more of theſe contemporary fluents are always equal, or in any certain conſtant ratio to each other, that their contemporary fluxions will likewiſe be equal, or in the ſame proportion: and that, on the contrary, if two or more of theſe contemporary fluxions are always equal, or in any certain conſtant ratio to each other, their contemporary fluents will likewiſe be equal, or in the ſame proportion.

We come now to find the fluxions of fluents, or the velocities with which flowing quantities increaſe or decreaſe at any terms aſſigned; the buſineſs of which is called the Direct Method of Fluxions. But, before we proceed, it may, perhaps, be neceſſary to premiſe a few things concerning the different ways of expreſſing an algebraic quantity, by ſome called the New Notation, and which was firſt introduced by the celebrated Dr. Wallis, whom we have ſo often had occaſion to mention in the former part of this article. Thus $\sqrt[3]{xx}$ may be expreſſed more commodiouſly by $x^{\frac{2}{3}}$, and $\sqrt{xxx}$ by $x^{\frac{3}{2}}$, $\sqrt{a-x}$ by $\overline{a-x}|^{\frac{1}{2}}$ and univerſally $\sqrt[n]{x^m} = x^{\frac{m}{n}}$.

Moreover it may be obſerved, that to divide any quantity by a power with an affirmative exponent, is the ſame as to multiply it by the ſame power with a negative exponent; as for example:

$$\frac{x}{\overline{a-y}|^{\frac{1}{2}}} = x \times \overline{a-y}|^{-\frac{1}{2}} \text{ or } \frac{x}{\overline{a-y}|^{\frac{m}{n}}} = x \times \overline{a-y}|^{-\frac{m}{n}}$$

and the contrary. Alſo $x^2 \times x^{\frac{3}{2}} = x^{2+\frac{2}{3}} = x^{\frac{7}{2}}$; $\overline{x^3}|^{2} = x^{3\times 2} = x^6$ and univerſally $x^m \times x^n x^{m+n}$. The obſervation of theſe hints may often be found of uſe in transforming of fluxions, which will ſometimes be neceſſary before their fluents can be properly attained.

We ſhall now proceed to ſhew the method of finding the fluxion of a given fluent; for the doing of which obſerve the following rules.

Rule I. To find the fluxion of a ſimple fluent; or, of that wherein there is but one variable letter.

Mark the variable letter, or flowing term, with a dot over it.

Thus, the fluxion of ax is $=a\dot{x}$.

For, if we ſuppoſe the variable rectangle A B, (*fig.* 3.) to be generated by the given line C B, ſetting out from the ſituation A D, and moving along with a parallel motion between the parallel and indefinite ſides A C and D B; it is evident, the velocity with which the rectangle flows, is equal to the generating line C B drawn into the velocity with which the point C generates, or moves along the line A C: that is, the fluxion of the rectangle A B, is equal to the invariable line C B drawn into the fluxion of the flowing or variable line A C. Therefore, if A D or C B $=a$, and A C or D B $=x$, then the fluxion of the rectangle ax will be $=a\times\dot{x}=a\dot{x}$.

Rule II. To find the fluxion of the product of two or more quantities drawn into each other.

Multiply the fluxion of each quantity ſeparately, by the other, or the product of the reſt of the quantities: and the ſum of theſe products will be the fluxion required.

Thus, the fluxion of xy is $=\dot{x}y+x\dot{y}$; the fluxion of axy is $=oxy+a\dot{x}y+ax\dot{y}$, i. e. $=a\dot{x}y+ax\dot{y}$; the fluxion of xyz is $=\dot{x}yz+x\dot{y}z+xy\dot{z}$; and the fluxion of $axyz$ is $=a\dot{x}yz+ax\dot{y}z+axy\dot{z}$.

1°. That the fluxion of xy is $=\dot{x}y+x\dot{y}$, may be thus demonſtrated.

Suppoſe a line, coincident with the indefinite right line A F, to move with a parallel motion along the indefinite right line A E; and, at the ſame time, another, coincident with the line A E, to move with a parallel motion along the line A F; and that the ſaid two lines move with ſuch different degrees of velocity, that their points of interſection may always be in the curve A I. Through any point B of the curve, draw C H parallel to A F, and D G parallel to A E. Then, by the line moving along the line A E, will the curvilineal ſpace A E I and rectangle D E be generated; and, by the line moving along the line A F, the curvilineal ſpace A F I and rectangle C F will be generated. Now, before the line moving along the line A E arrives at the ſituation C H, it is evident, that, he curvilineal ſpace A E I will increaſe ſlower, or flow with a leſs degree of velocity than the rectangle D E, and afterwards with a greater; therefore, at the term C B, they will flow with one and the ſame degree of velocity. So likewiſe, the curvilineal ſpace A F I will flow or increaſe ſlower, or with a leſs degree of velocity, than the rectangle C F, before the generating line, moving along the line A F, comes to the ſituation D G; and afterwards, faſter, or with a greater degree of velocity; and therefore, at the term D B, they will increaſe or flow with an equal degree of velocity. That is, the fluxion of the curvilineal ſpace A E I, is, at the term C B, equal to the fluction of the rectangle D E at the ſaid term C B; and the fluxion of the curvilineal ſpace A F I, is, at the term D B, equal to the fluxion of the rectangle C F at the term D B. But the fluxion of the rectangle D E, at the term C B, is equal to C B drawn into the fluxion of A C; and the fluxion of the rectangle C F, at the term D B, is equal to D B drawn into the fluxion of A D. Hence, therefore, the fluxion of the flowing rectangle A C B D (which is the ſum of the two curvilineal ſpaces A C B and A D B), is equal to the ſum of C B drawn into the fluxion of A C, added to D B drawn into the fluxion of A D: that is, if we put A C or D B $= x$, and A D or C B $= y$, the fluxion of the rectangle xy will be $= \dot{x}y + x\dot{y}$.

2°. Hence, the fluxion of axy is $= a\dot{x}y + ax\dot{y}$; for, ſince xy is always in the fixt ratio to axy, of 1 to a; therefore the fluxion of xy is to the fluxion of axy, as 1 to a: that is, $1 : a :: \dot{x}y + x\dot{y} : a\dot{x}y + ax\dot{y} =$ the fluxion of axy.

3°. And, that the fluxion of xyz is $= \dot{x}yz + x\dot{y}z + xy\dot{z}$, may thus be proved. Let the length, breadth, and depth, of a parallelopipedon, be repreſented by x, y, and z, reſpectively. Now, this parallelopipedon will be equal to three pyramids, whoſe baſes are xy, xz, and yz, and altitudes z, y, and x, reſpectively: and therefore, the ſum of the fluxions of theſe pyramids, will be equal to the fluxion of the parallelopipedon xyz. Let either of the pyramids be repreſented as in *fig.* 4. by A E H or A C B, which ſuppoſe to be generated by the variable plane A F moving with a parallel motion along the indefinite right line A E; and, at the ſame time, let the parallelopipedon A D G E (whoſe face A D or E G is equal and ſimilar to the baſe of the pyramid at the term C B), be generated by the plane A D, which is coincident with the plane A F. Now, it is plain, that the pyramid will increaſe ſlower, or flow with a leſs degree of velocity, than the parallelopipedon, before the generating planes arrive at the term C B; and afterwards faſter, or with a greater degree of velocity: therefore, at the ſaid term C B, they will flow, or be generated, with the ſame or an equal degree of velocity: but, it is likewiſe plain, that the velocity with which the parallelopipedon is generated, is equal to its face A D or C B drawn into the velocity of its motion along the line or ſide A E; therefore, the velocity with which the pyramid is generated is, at the term C B, equal to its baſe C B drawn into the velocity of its motion at the point C, along the ſide A E: that is, the fluxion of the pyramid A C B, is equal to its baſe C B drawn into the fluxion of its altitude A C. Hence then, when the baſe is xy, and altitude z, the fluxion of the pyramid is $= xy \times \dot{z} = xy\dot{z}$; and, when the baſe is xz and altitude y, the fluxion of it is $= xz \times \dot{y} = x\dot{y}z$; and, laſtly, when the baſe is yz and altitude x, its fluxion is $= yz \times \dot{x} = \dot{x}yz$. Conſequently, $\dot{x}yz + x\dot{y}z + xy\dot{z}$ (which is the ſum of the fluxions of the three pyramids) is $=$ the fluxion of the parallelopipedon xyz.

4°. And that the fluxion of $axyz$ is $= a\dot{x}yz + ax\dot{y}z + axy\dot{z}$, follows from the above Dem. 3°. for ſince $xyz : axyz :: 1 : a$, therefore $1 : a ::$ fluxion of xyz : fluxion of $axyz$; i. e. $1 : a :: \dot{x}yz + x\dot{y}z + xy\dot{x} : a\dot{x}yz + ax\dot{y}z + axy\dot{z} =$ the fluxion of $axyz$.

Rule III. To find the fluxion of a fraction.

Multiply the denominator into the fluxion of the numerator; from the product of which, ſubtract the numerator drawn into the fluxion of the denominator: then divide the remainder by the ſquare of the denominator; and you will have the fluxion of the fraction required.

Thus, the fluxion of $\frac{x}{y}$ is $= \frac{\dot{x}y - x\dot{y}}{y^2}$

For, putting $z = \frac{x}{y}$; then $yz = x$; and the fluxion of this equation is $\dot{y}z + y\dot{z} = \dot{x}$; therefore, by tranſpoſition $y\dot{z} = \dot{x} - \dot{y}z$, and, by diviſion, $\dot{x} = \frac{\dot{x} - \dot{y}z}{y}$; that is, (by reſtitution, or writing $\frac{x}{y}$ for z its equal), $\dot{z} = \frac{\dot{x} - \dot{y} \times \frac{x}{y}}{y} = \frac{\dot{x}y - x\dot{y}}{y^2} =$ the fluxion of $\frac{x}{y}$.

Hence, the fluxion of x^{-1} is $= -x^{-2}\dot{x}$; the fluxion of x^{-2} is $= -2x^{-3}\dot{x}$; the fluxion of x^{-3} is $= -3x^{-4}\dot{x}$; the fluxion of x^{-4} is $= -4x^{-5}\dot{x}$; &c. And, if m be made to repreſent any negative whole-number, the fluxion of x^m will be $= mx^{m-1}x$.

Rule IV. To find the fluxion of an expreſſion compounded of different terms or quantities connected together by the ſigns + and —.

Find the fluxion of each term by the preceding rules; which connect together with the ſigns of the reſpective terms, and you will have the fluxion required.

Thus the fluxion of $ax + y^2 - z$ is $= a\dot{x} + 2y\dot{y} - \dot{z}$. For, putting $ax + y^2 - z = v$; then $ax + y^2 = v + z$: and, it is evident, the ſum of the fluxions of ax and v^2 muſt be equal to the ſum of the fluxions of v and z; that is, $a\dot{x} + 2y\dot{y} = \dot{v} + \dot{z}$; therefore, by tranſpoſition, $a\dot{x}+2y\dot{y}-\dot{z}=\dot{v}=$ the fluxion of $ax+y^2-z$.

And, the fluxion of $x-a^2y+xy$ is $=\dot{z}-a^2\dot{y}+\dot{x}y+x\dot{y}$. And, the fluxion of $ax^2+x-\frac{x}{y}$ is $=2ax\dot{x}+\dot{x}-:\frac{\dot{x}y-x\dot{y}}{y^2}$.

Rule V. To find the fluxion of any power of a fluent or flowing quantity; whether the index be integral or fractional, affirmative or negative.

Multiply the whole term by the index of the power; then ſubtract 1 from the ſaid index, and multiply this whole term by the fluxion of the root of the fluent; and you will have the fluxion of the power required.

Thus, the fluxion of $\overline{x+x^2}|^3$ is $=3\times\overline{x+x^2}|^{3-1}\times\overline{\dot{x}+2x\dot{x}}$, i. e. $=\overline{x+x^2}|^2\times\overline{3\dot{x}+6x\dot{x}}$; the fluxion of $\overline{a+x}|^{-2}$ is $=-2\times\overline{a+x}|^{-2-1}\times\dot{x}$, i. e. $=\overline{a+x}|^{-3}\times-2\dot{x}$. And, univerſally, the fluxion of $x^{\frac{m}{n}}$ is $=\frac{m}{n}\times x^{\frac{m}{n}-1}\times\dot{x}$, i. e. $=\frac{m}{n}x^{\frac{m}{n}-1}\dot{x}$; where, either m or n, or both, may be either integral or fractional, affirmative or negative: ſo that the index $\frac{m}{n}$, expreſſes, or repreſents, any affirmative or negative whole-number or fraction whatſoever.

Rule VI. To find the fluxion of a logarithm.

The fluxion of the hyperbolic logarithm of any quantity, is equal to the fluxion of that quantity, divided by the quantity itſelf.

Thus, the fluxion of the hyperbolic logarithm of x is $=\frac{\dot{x}}{x}$. The fluxion of the hyperbolic logarithm of $\overline{a+x}$ is $=\frac{\dot{x}}{a+x}$. The fluxion of the hyperbolic logarithm of $\overline{x+\overline{a^2+x^2}|^{\frac{1}{2}}}$ is $=\frac{\dot{x}}{\overline{a^2+x^2}|^{\frac{1}{2}}}$.

Note, Hitherto we have ſuppoſed, when one variable quantity in any fluent increaſes, that the others, if any, increaſe likewiſe: but it often happens that ſome of them decreaſe, while the others increaſe; in which caſe, the fluxions of the decreaſing are negative, with reſpect to thoſe of the increaſing quantities; and therefore, the ſigns of the terms which are affected with them, ought to be negative.

Thus, if whilſt x increaſes, y decreaſes; the fluxion of the rectangle xy, will not be expreſſed by $\dot{x}y+x\dot{y}$, but by $\dot{x}y-x\dot{y}$.

For, let the flowing or variable rectangle A B, (*fig.* 5.) be continually increaſing by the parallel motion of the variable line C B moving from the ſituation A F along the line A E; and, continually diminiſhing by the motion of the variable line D B, parallel to the line A E, and approaching towards it along the line F A; that is, let the ſide A C = D B continually increaſe, while the ſide A D = C B continually decreaſes. Now (putting A C $=x$, and A D $=y$,) it follows, that the fluxion of the increaſe will be $=\dot{x}y$, and that the fluxion of the decreaſe will be $=x\dot{y}$; therefore the fluxion of the decreaſe, ſubtracted from the fluxion of the increaſe, leaves $\dot{x}y-x\dot{y}=$ the fluxion of the rectangle xy; or, the velocity with which it flows.

Underſtand the ſame of the fluxion of any fluent of a like nature whatſoever.

Inverſe Method of FLUXIONS. See INVERSE.

FLY, in zoology, a large order of inſects, the diſtinguiſhing characteriſtic of which is, that their wings are tranſparent; by this they are diſtinguiſhed from beetles, butterflies, and graſshoppers.

FLY, in mechanics, a croſs with leaden weights at its ends, or rather a heavy wheel at right angles to the axis of a windlas, jack, or the like; by means of which the force of the power, whatever it be, is not only preſerved, but equally diſtributed in all parts of the revolution of the machine.

FLY-BOAT, or FLIGHT, in the Dutch marine, certain merchant-ſhips of a very clumſy, uncouth built, nearly ſimilar to the genius of the builders: they are generally from four to ſix hundred tons, and diſtinguiſhed by a very high ſtern, like a Gothic turret above, and very broad buttocks below. See BUTTOCK.

FLYERS, in architecture, ſuch ſtairs as go ſtraight, and do not wind round; nor have the ſteps made tapering, but the fore and back part of each ſtair, and the ends, reſpectively parallel to one another; ſo that if one flight do not carry you to your intended height, there is a broad half ſpace, from whence you begin to fly again, with ſteps every where of the ſame length and breadth as before.

FLYING ARMY, a ſmall body under a lieutenant or major general, ſent to harraſs the country, intercept convoys, prevent the enemy's incurſions, cover its own garriſons, and keep the enemy in continual alarm.

FLYING-BRIDGE. See the article BRIDGE.

FLYING-CAMP. See the article CAMP.

FLYING-FISH, a name given by the Engliſh writers to ſeveral ſpecies of fiſh, which, by means of their long fins, have a method of keeping themſelves out of the water a long time.

FLYING-PINION is part of a clock, having a fly, or fan, whereby to gather air, and ſo bridle the rapidity of the clock's motion, when the weight deſcends in the ſtriking part. See the article CLOCK.

FOAL, or COLT, the young of the horſe kind. The word colt, among the dealers, is underſtood of the male kind.

FOCUS, in geometry and conic ſections, is applied to certain points in the parabola, wherein the rays reflected from all parts of theſe curves meet and concur.

The word is Latin, and literally ſignifies a fire-hearth.

Foci *of an Ellipſis*, are two points, as F *f* (Plate LV. *fig.* 8.) in the longeſt axis of the ellipſis; from each of which, if any two right-lines are drawn, meeting each other in the periphery of the ellipſis, as *f* N, F N, or *f* L, F L, their ſum will be always equal to the longeſt axis; and therefore, when an ellipſis and its two principal axis are given, and the foci are required, you need only take half of the longeſt, or tranſverſe axis, in your compaſſes, and ſetting one foot in the point where the ſhorteſt, or conjugate diameter, cuts the periphery, and the other foot will cut the longeſt axis in the foci required. See Ellipsis.

Focus *of an Hyperbola* is that point in the axis through which the latus rectum paſſes. See Conic *Sections* and Hyperbola.

Focus *of a Parabola* is that point in the axis wherein the ſemi-ordinate is equal to the ſemi-parameter; or it is that point through which the latus rectum paſſes. See Conic *Sections* and Parabola.

Focus, in optics, is the point wherein the rays are collected, after they have undergone refraction. See Mirror and Lens.

It is ſo called becauſe the ſun's rays being united within a very ſmall compaſs or circle, are greatly conſtipated and condenſed; by which means their action or heat is proportionally increaſed and therefore objects poſited in that point will be greatly heated, burnt, or melted.

Virtual Focus, in dioptrics, is the point from which the refracted rays, when they are rendered divergent by refraction, begin to diverge.

FODDER, any kind of meat for horſes, or other cattle. In ſome places, hay and ſtraw, mingled together, is peculiarly denominated fodder.

Fodder, in the civil law, is uſed for a prerogative that the prince has, to be provided of corn and other meats for his horſes, by the ſubjects, in his warlike expeditions.

Fodder, in mining, a meaſure containing twenty-two hundred and an half weight, though in London but twenty hundred weight.

FODINA, in anatomy, the labyrinth of the ear. See Ear.

FOECUNDITY, or Fecundity, the ſame with fertility. See the article Fertility.

FOENUGREEK, *Fœnum-græcum*, in botany, an annual plant, producing trifoliate leaves, placed alternately on a green, ſlender, hollow ſtalk, about a foot and a half high. The flowers proceed from the wings of the ſtalk, and are papilionaceous and white: theſe are ſucceeded by long compreſſed crooked pods, which contain a number of yellowiſh rhomboidal ſeeds.

This plant is cultivated in the fields in the ſouth of France, and in Germany. The ſeeds are uſed in medicine in cataplaſms and fomentations, being emollient and diſcutient to a great degree. It is alſo preſcribed in carminative and anodyne clyſters to abate the acrimony of the humours, and to beſtow a mucus on the corroded inteſtines.

FOETOR, in medicine, ſtinking or fœtid effluvia, ariſing from the body, or any part thereof.

FOETUS, in phyſiology, denotes the child while it is contained in the mother's womb, but particularly after it is formed, till which time it is more properly called embryo. See the article Generation.

FOG, or Mist, a meteor, conſiſting of groſs vapours, floating near the ſurface of the earth.

FOGAGE, in the foreſt law, is rank graſs not eaten up in ſummer.

FOIL, among glaſs-grinders, a ſheet of tin, with quickſilver or the like, laid on the backſide of a looking-glaſs, to make it reflect.

Foil, among jewellers, a thin leaf of metal placed under a precious ſtone, in order to make it look tranſparent, and give it an agreeable different colour, either deep or pale: thus, if you want a ſtone to be made of a pale colour, put a foil of that colour under it; or if you would have it deep, lay a dark one under it.

FOLIAGE, among botaniſts, particularly ſignifies the leaves of plants; though by ſome is applied to the petals of a flower. See Leaf and Corolla.

FOLIATING *of Looking-Glaſſes* is performed by fixing quickſilver on the reverſe ſurface, by means of plates of tin; which amalgamating or combining with the quickſilver, takes away its fluidity, and renders it ſo tenacious, as to be compreſſed into a very thin coat or plate, capable of adhering to the ſurface of the glaſs.

There are ſeveral manners of laying the quickſilver and tin on the glaſs; and it is by ſome practiſed, to uſe the quickſilver alone; and by others, to compound with it tin and lead; and biſmuth has likewiſe been frequently uſed inſtead of them: but it is not neceſſary, when the operation is well conducted, to make any addition to the quickſilver. The following is ane of the beſt methods hitherto practiſed.

" A proper number of ſheets of thin paper muſt be procured; which paper ſhould be of a ſoft ſpongy nature, like thar called blotting paper. This paper muſt be ſpread on a table with a very level even ſurface, and fixed very firmly; or it is better to uſe a marble table or ſlab; but ſo much only of the table ſhould be covered, as may form an area of the ſame figure with that of the glaſs to be ſilvered, a little enlarged. Over the ſurface of the paper muſt be ſprinkled ſome powdered chalk; which ſhould be rolled or beaten very thin, muſt then be laid upon the paper ſprinkled with chalk, in the moſt ſmooth and even manner: and where there is occaſion, on account of the ſize of the glaſs, to uſe more than one, they ſhould be joined with great exactneſs, rather ſuffering nevertheleſs the edge of one to bear on the other, than leaving any deficiency; ſo that the whole ſurface of the paper may be perfectly covered. Quickſilver is then to be poured upon theſe leaves of tin; and ſpread over every part of it by a hare's foot, or the feathered part of a quill. The ſheets of very thin ſmooth paper, of which the kind called fan paper is beſt, muſt be then laid over the quickſilver, leaving a margin beyond the quickſilver; and upon this paper the glaſs muſt be gently laid: and then, being preſſed down with the one hand, the paper muſt be gently drawn from under it with the other, by taking hold of the margin left for that purpoſe. The upper ſurface of the glaſs muſt then be covered with thicker paper, and a conſiderable weight put over it, in order to preſs out all the quickſilver that is not fixed by the tin; as well as to make it adhere the more firmly to the glaſs. When no more quickſilver appears to drain off, the weights and paper may be removed; and the operation will be complete."

Globes of glaſs may be ſilvered; but as no preſſure can be given, the plates of tin cannot be uſed; and the quickſilver muſt therefore be rendered of a proper conſiſtence, by amalgamating it with ſome of the other metallic ſubſtances. The moſt approved method of doing this is as follows.

"Take of quickſilver two parts, of biſmuth two parts, and of tin and lead each one part. Melt the tin and lead together, and when they are fluid, add the biſmuth; when that is melted likewiſe, take them from the fire, and put the quickſilver gradually to them; ſtirring the mixture till the whole be united. After the maſs is become ſo cool, as not to endanger its breaking the glaſs, pour it into the globe to be ſilvered; uſing a funnel, which will carry it to the bottom of the globe. Move the glaſs then gently about, ſo that the amalgamated matter may flow over every part, and adhere to it; which will effectually ſilver the globe. When every part is covered, pour out the redundant quantity, and keep the glaſs ſtill, till it be perfectly cool. If, during the operation, the mixture is ſet in the globe, and be not ſufficiently liquid to flow about, and cohere with the glaſs, a gentle heat muſt be adminiſtred, which will remedy this defect; and if, on the contrary, the matter appear too fluid, and have not ſufficient tenacity to fix itſelf to the glaſs, it muſt be taken out, and an additional quantity of the biſmuth, tin, and lead, added, by means of a proper heat."

FOLIATION, among botaniſts, ſignifies the complicate or folded ſtate the leaves are in whilſt they remain concealed within the buds of plants.

FOLIO, in merchant books, denotes a page, or rather both the right and left hand pages, theſe being expreſſed by the ſame figure, and correſponding to each other. See BOOK-KEEPING.

FOLIO, among printers and bookſellers, the largeſt form of books, when each ſheet is printed, that it may be bound up in two leaves only.

FOMAHANT, or FOMALHANT, in aſtronomy, a ſtar of the firſt magnitude in Aquarius, whoſe latitude is 29° 19′ 11″ north, and longitude 27° 23′ 24″ of Capricornus, according to Mr. Flamſtead's catalogue.

FOMENTATION, in medicine, the ſame with a liquid epithema, if applied hot; and is the bathing of any part of the body in a proper liquor, commonly made by a decoction of herbs in water, wine, milk, &c. being generally applied by means of ſtupes or doubled flannels, dipped in the medicated decoction, and all the liquor, if very hot, expreſſed out of them, leſt it ſhould ſcald the part, raiſe bliſters, &c. And it is farther obſervable, that a certain degree of heat will diſſolve and diſſipate a tumour, whilſt a higher degree of it will harden and make it ſchirrous.

The word is Latin, *fomentatio*, and derived from *fomento*, to foment.

FONT, among eccleſiaſtical writers, a large baſon, in which water is kept for the baptizing of infants, or other perſons.

It is ſo called probably becauſe baptiſm was uſually performed among the primitive Chriſtians at ſprings or fountains.

FONTANELLA, in anatomy, the quadrangular aperture, between the os frontis and oſſa ſincipitis, in infants juſt born, which is alſo called fons pulſatilis.

FONTICULUS, or FONTANELLA, in ſurgery, an iſſue, ſeton, or ſmall ulcer made in various parts of the body, in order to eliminate the latent corruption out of it. See ISSUE, SETON, &c.

FONTINALIA, in Roman antiquity, a religious feaſt celebrated on October 13, in honour of the nymphs of wells and fountains.

FONTINATIS, in botany, a genus of moſſes. The male flower is almoſt ſeſſile. The antheræ is oblong, with an open mouth, and covered with ſmooth conic calyptræ.

FOOD implies whatever aliments are taken into the body, to nouriſh it. See DIET, DRINK, ALIMENT, &c.

FOOT, *Pes*, a part of the body of moſt animals, whereon they ſtand, walk, &c.

FOOT, in the Latin and Greek poetry, a metre or meaſure, compoſed of a certain number of long and ſhort ſyllables.

FOOT, a longitudinal meaſure; in England it is commonly divided into 12 inches, but by geometricians into 10 digits, and every digit into 10 lines; this latter kind of diviſion is moſtly obſerved in foreign nations: but the foot itſelf differs in length in different countries; thus the Engliſh foot is to that of Paris as 1000 to 1068; to that of Dantzick as 1000 to 944; to the ancient Greek as 1000 to 1007; to the old Roman as 1000 to 970; and to that of Venice as 1000 to 1162.

Foot-Bank, or Foot-Step, in fortification, the ſame with banquette. See the article Banquette.

Foot-Husks, among botaniſts, ſhort heads, out of which flowers grow.

Foot-Level, among artificers, an inſtrument that ſerves as a foot-rule, a ſquare, and a level. See the articles Level, Rule, and Square.

Foot-Pace, or Half-Pace, among carpenters, a pair of ſtairs, whereon, after four or ſix ſteps, you arrive at a broad place, where you may take two or three paces before you aſcend another ſtep. The deſign of which is to eaſe the legs in aſcending the reſt of the ſteps. See the article Stair-Case.

Foot-Ropes, among ſailors, the ſame with the horſes of the yards. See the article Horse.

FORAMEN, in anatomy, a name given to ſeveral apertures, or perforations in divers parts of the body; as, 1. The external and internal foramina of the cranium or ſkull, 2. The foramina in the upper and lower jaw. 3. Foramen lachrymale. 4. Foramen membranæ tympani.

Foramen Ovale, an oval aperture or paſſage through the heart of a fœtus, which cloſes up after birth.

FORCE *of Bodies in Motion*, or *Moving* Force, in phyſics, is that force with which bodies change their place. We do not here mean the ſtroke, preſſure, or action, which cauſes this change of place in a body, but the force which it has while it is moving from one place to another, and may always be known by the effect which it is able to produce, that is by the ſtroke which the moving body can give, or by the reſiſtance or obſtacle which it is able to overcome. It may likewiſe be found mathematically, by multiplying the maſs or quantity of matter contained in any body by its velocity.

The famous diſpute on this ſubject which happened amongſt the philoſophers of the laſt age is of too extraordinary a nature to paſs entirely unnoticed here. It was firſt begun between the celebrated M. Huygens, and the abbot Catalan, about the force of oſcillating bodies; but the aforeſaid abbot, and Mr. Leibnitz, whom we have had occaſion to mention ſo often, were the two firſt who ſeem to have begun the diſpute in earneſt; the latter of theſe gentlemen declaring in expreſs words, that the force of bodies are as their maſſes multiplied by the ſquare of their velocities. He was anſwered by Catalan, and afterwards by Mr. Papin; he replied, and was replied to again; till at laſt one ſide or other was joined by all the philoſophers in Europe: however, Leibnitz and his party proved too weak to withſtand the arguments of the other, backed by the Newtonion method of philoſophizing, which depends only on facts and experiments: to counter-balance which, their opponents had recourſe to critical diſtinctions, and metaphyſical ſubtleties, to evade the force of their arguments, explaining and re-explaining, till at length they ſeem to have explained away their own meaning, if they might be ſaid to have any at firſt. To ſay the truth, the diſpute ſeems to have been occaſioned by a miſtake, and continued through a miſunderſtanding, whether a wilful one or not we cannot take upon ourſelves to ſay; for when we ſay that the force of bodies in motion is as their velocity multiplied into their maſs, we underſtand the action of thoſe bodies to be inſtantaneous, for if time be taken into the conſideration, the effects will be very different, and in ſome caſes, when the action is applied to ſoft or yielding bodies, will approach very nearly to the ſquares of the velocities multiplied into the maſs; as was aſſerted by Mr. Leibnitz and his followers.

Attractive Force. See Attraction.

Central Force. See Central *Force.*

Centrifugal Force. See Centrifugal *Force.*

Centripetal Force. See Centripetal *Force.*

Force *of the Heart.* See Heart.

Force *of the Wind.* See Anemometer.

Force, in law, ſignifies any unlawful violence offered to things or perſons.

FORCEPS, in ſurgery, &c. an inſtrument that is well known, of which there are ſeveral ſorts, adapted to various operations. Their uſes are to lay hold of any thing and extract it from the body.

FORCER, or Forcing-Pump, in mechanics, is a kind of pump in which there is a forcer or piſton, without a valve. See Pump.

FORCIBLE, in law, ſomething done illegally. See the article Force.

FORCING, among gardeners, the raiſing of cucumbers, melons, ſtrawberries, &c. on common hot-beds; alſo the producing ripe fruit from ſeveral ſorts of trees before their uſual ſeaſon. Peaches, nectarines, cherries, and grapes, being the moſt valuable and admired wall-fruits, the common method of forcing them is as follows: The trees deſigned to be forced ſhould be in good condition, with a good quantity of blowing wood; theſe ſhould be covered with moveable glaſſes ſloping from the top of the wall to about four feet and a half from the bottom, and cloſed at each end, theſe may be put on in February, as early forcing is liable to miſcarriage: on the north ſide of the wall there ſhould be a quantity of new horſe-dung, placed ſloping as the glaſſes on the other ſide, but wider; this will throw a conſiderable heat through the wall (which ſhould not be too thick) and thereby cauſe (with the aid of the ſun in front) the bloſſoms and leaves to come out quickly: when the heat of the dung is much abated, it may be neceſſary to remove it, and lay a freſh quantity in its ſtead. When the trees are in full flower, they ſhould have a conſiderable ſhare of air at all favourable opportunities, otherwiſe the bloſſoms will fall off, and, conſequently, the crop miſcarry; alſo it will be neceſſary to give the roots frequent refreſhings of water, as likewiſe the branches, but this muſt be done in the morning, when there is an appearance of a ſunny day.

But we think the following method of forcing preferable to the former; this is practiſed in Holland, and lately introduced in a few gardens in England, particularly at the earl of Ancram's, at Charlton in Kent, where they force peaches and nectarines in very great perfection without detriment to the trees. To give the reader a proper idea of the forcing-frame, we have exhibited in Plate LV. *fig.* 7, a ſketch in perſpective (the front end is the ſection) of one which contains two trees, and may be continued to any length at pleaſure: the line *a* is the ſurface of the ground; *b* is the pit filled with new tan, which heats the frame; *c* is the ſpace left to go in to manage the under part of the tree, and to gather the under fruit, which are almoſt as numerous as thoſe on the upper-ſide; *d* is a lattice-work to train the trees on, at about ten inches below the glaſſes *f*. The roots of the trees are partly within the frame and partly without, extending within as far as the tan-bed *b*, the bottom of the ſtem being juſt within the lower part of the frame at *g*. The lights or glaſſes may be about four feet and a half or five feet wide, and ſix feet and a half long; each of which will contain a middling ſized tree. It may aſked how a tree can properly be planted to form the direction here deſcribed (which may make an angle of about forty degrees with the horizon); in anſwer to which, it is to be ſuppoſed that the tree has previouſly been trained againſt a wall, and conſequently the major part of the roots have a direction but one way; therefore in planting the tree to force in this ſort of a frame, it is only reverſing it, that is, the ſide which was next the wall will be uppermoſt in the frame, and the roots downward, which will be of no detriment to it. The management, &c. is much the ſame as the former method of forcing; but, for the benefit of thoſe who have an inclination to early raiſed fruits, we would by all means recommend this laſt form; and at the ſame time we cannot but diſapprove of thoſe forcing frames which have a fleue in the wall, as it is ſo very drying, that few trees eſcape being peſtered with a multitude of inſects, which prey on them ſo much as finally to be their utter deſtruction, unleſs an almoſt continual waſhing the leaves and branches prevents it.

FORCING *of Wine*. See WINE.

FORE-CASTLE, in ſhip-building, a ſhort deck which reaches from the top of the ſtem to the after part of the fore-ſhrouds; or it commonly reaches as far behind, or abaſt, the fore-maſt, as it is from the maſt to the upper part of the ſtem.

FORE-CLOSED, in law, ſignifies the being ſhut out, and excluded, or barred, the equity of redemption on mortgages, &c.

FORE-FOOT, in ſhip-building, a piece of crooked timber, the lower part of which is bolted to the fore-end of the keel, of which it is a part, and the upper part laid on and bolted to the foot of the ſtem, of which it is alſo a part. See this fully explained in the article SHIP-BUILDING.

FORE-JUDGED, in law, ſignifies a judgment, whereby one is deprived, or put by a thing in queſtion.

FORELAND, in the ſea-language, the ſame with a cape. See the article CAPE.

FORELAND, in fortification, the ſame with liziere. See the article LIZIERE.

FORE-LOCKS, little wedges of iron thruſt to the ends of the bolts in a ſhip's ſide, to prevent them from drawing as the ſhips labours at ſea.

FORELORN-*Hope*, in the military art, ſignifies men detached from ſeveral regiments, or otherwiſe appointed, to make the firſt attack in day of battle; or at a ſiege, to ſtorm the counterſcarp, mount the breach, or the like.

They are ſo called from the great danger they are unavoidably expoſed to; but the word is old, and begins to be obſolete.

FORE-MAST. See the article MAST.

FORE-REACHING, or, in the ſea-language, the act of making a greater progreſs forward than another ſhip; as the Tartar fore-reaches on the Eagle, i. e. advances quicker, or gains ground of her.

FORE-SKIN, in anatomy, the ſame with prepuce. See the article PREPUCE.

FOREST, *Sylva*, in general, a great wood, or a large extent of ground covered with trees.

FORE-STAFF, or CROSS-STAFF, a mathematical inſtrument uſed to take the ſun's altitude.

FORESTALLER, a perſon who is guilty of foreſtalling.

FORESTALLING, in law, buying or bargaining for any corn, cattle, victuals, or merchandize, in the way as they come to fairs or markets to be ſold, before they get thither, with an intent to ſell the ſame again at a higher price.

FORESTER, a ſworn officer of the foreſt, appointed by the king's letters patent, to walk the foreſt at all hours, watch over the vert and veniſon; alſo to make attachments and true preſentments of all treſpaſſes committed within the foreſt.

FORE-TOP-MAST. See the article TOP-MAST.

FORFEITURE, properly ſignifies the effect of tranſgreſſing ſome penal law, and extends to lands or goods.

Forfeiture differs from confiſcation, in that the former is more general, whilſt confiſcation is particularly applied to ſuch things as become forfeited to the king's exchequer; and goods confiſcated, are ſaid to be ſuch as no perſon claims.

FOREFIELD, among miners, the fartheſt place of a meer of ground.

FORGE, properly ſignifies a little furnace, wherein ſmiths, and other artificers of iron or ſteel, &c. heat their metals red hot, in order to ſoften and render them more malleable and manageable on the anvil.

FORGERY, in a legal ſenſe, is where a perſon fraudulently makes and publiſhes falſe writings to another's prejudice: or, it ſignifies the writ that lies againſt him who offends that way.

FORGING, in ſmithery, the beating or hammering iron on the anvil, after having firſt made it red hot in the forge, in order to extend it into various forms, and faſhion it into works.

FORM, *forma*, in phyſics, the eſſential or diſtinguiſhing modification of the matter whereof a natural body is compoſed, ſo as thereby to give it ſuch a particular manner of exiſtence, being that which conſtitutes it ſuch a particular body, and diſtinguiſhes it from every other body.

FORMS *of Syllogiſms*, or *Syllogiſtic* FORM, among logicians, a juſt diſpoſition both of the terms, in reſpect of predicate and ſubject; and of the propoſitions, in reſpect of quantity and quality: by which is only meant a diſpoſition wherein the concluſion follows duly and legitimately from the two premiſes; there being no form where there is no concluſion. See the article SYLLOGISM.

FORM, in theology, is ſaid to be one of the eſſential parts of the ſacraments; being that which gives them their ſacramental nature and efficacy, and conſiſting in certain words, which the prieſt pronounces in adminiſtering them.

FORM is alſo uſed in a moral ſenſe, for the manner of being, or doing a thing according to rules; thus we ſay, a form of government, a form of argument, &c.

FORM, in law, the rules eſtabliſhed and requiſite to be obſerved in legal proceedings.

FORM, in carpentry, is uſed to denote the long ſeats or benches in the choirs of churches, or in ſchools, for the prieſts, prebendaries, religious, or ſcholars, to ſit on.

At ſchools, the word form is frequently applied to what is otherwiſe termed a claſs. See CLASS.

FORM alſo denotes the external appearance or ſurface of a body, or the diſpoſition of its parts, as to the length, breadth, and thickneſs. See the article FIGURE.

FORM is alſo uſed among mechanics, for a ſort of mould, whereon any thing is faſhioned or wrought; as the hatter's form, the paper-maker's form, &c. See the article HATTER, &c.

Printer's FORM, an aſſemblage of letters, words, and lines, ranged in order, and ſo diſpoſed into pages by the compoſitor, from which, by means of ink and a preſs, the printed ſheets are drawn.

Every form is incloſed in an iron chaſe, wherein it is firmly locked by a number of pieces of wood; ſome long and narrow, and others of the form of wedges. See PRINTING.

FORMA PAUPERIS, in law, is where a perſon has juſt cauſe of ſuit, but is ſo poor that he cannot defray the uſual charges of ſuing at law or in equity; in which caſe, on making oath that he is not worth five pounds in the world, on all his debts being paid, and producing a certificate from ſome lawyer that he has good cauſe of ſuit, the judge will admit him to ſue in forma pauperis; that is, without paying any fee to counſellors, attorneys, clerks, &c.

FORMATION, in philoſophy, an act whereby ſomething is formed or produced.

FORMATION, in grammar, ſignifies the manner of forming one word from another; thus accountantſhip is formed from accountant, and this laſt from account.

FORMERS, in gunnery, round pieces of wood, fitted to the diameter of the bore of a gun, chiefly uſed for making cartridges.

On theſe formers, the paper, parchment, or cotton, which is to make the cartridge, are rolled before it be ſewed.

FORMICA, the ant, in zoology. See the article ANT.

FORMICA-LEO, the ant-lion, or ant-eater, in zoology, an inſect ſo called from its devouring great numbers of ants. It is the caterpillar or worm of a fly, much reſembling the libellæ, or dragon-flies.

FORMING *the line*, in naval affairs, drawing up the ſhips of a ſquadron or diviſion in a ſtrait line, about an hundred and twenty fathoms diſtant from each other. See the article LINE *of Battle*.

FORMULA, or FORMULARY, a rule or model, or certain terms preſcribed or agreed by authority, for the form and manner of an act, inſtrument, proceeding, or the like.

FORMULA, in medicine, imports the conſtitution of medicines, either ſimple or compound, both with reſpect to their preſcription and conſiſtence. Paracelſus calls red and clear urine, formula urinæ.

FORNICATION, the act of incontinency between ſingle perſons; for when either of the parties is married, ſuch act is adultery. See ADULTERY.

FORNIX, in anatomy, a part of the brain placed under the ſeptum lucidum, and, like it, compoſed of a medullary ſubſtance. Its anterior part riſes with a double baſe, but the two parts ſoon unite: the hinder part is likewiſe bifid, and thence called crura fornicis, and by ſome, pedes hippocampi. See the article BRAIN.

FORRAGE, in the military art, denotes hay, oats, barley, wheat, graſs, clover, &c. brought into the camp by the troopers, for the ſuſtenance of their horſes.

Dry forage is the hay, oats, &c. delivered out of the magazines, to an army in garriſon, or when they take the field, before the green forage is ſufficiently grown up to ſupply the troops.

FORT, in the military art, a ſmall fortified place, environed on all ſides with a moat, rampart, and parapet. Its uſe is to ſecure ſome high ground, or the paſſage of a river, to make good an advantageous poſt, to defend the lines and quarters of a ſiege, &c.

Forts are made of different figures and extents, according as the ground requires. Some are fortified with baſtions, others with demi-baſtions. Some again are in form of a ſquare, others of a pentagon. A fort differs from a citadel, as this laſt is built to command ſome town. See the article CITADEL.

Royal-FORT, one whoſe line of defence is at leaſt twenty-ſix fathoms long.

Star-FORT, a redoubt formed by a number of re-entering and ſaliant angles, the ſides of which flank each other.

FORTIFICATION, the art of fortifying a town, or other place; or of putting them in ſuch a poſture of defence, that every one of its parts defends, and is defended by ſome other parts, by means of ramparts, parapets, moats, and other bulwarks; to the end, that a ſmall number of men within may be able to defend themſelves for a conſiderable time againſt the aſſaults of a numerous army without, ſo that the enemy, in attacking them, muſt of neceſſity, ſuffer great loſs.

Fortification is either ancient or modern, regular or irregular. Ancient fortification, at firſt, conſiſted of walls or defences made of trunks, and other branches of trees, mixed with earth, to ſecure them againſt the attacks of the enemy. This was afterwards altered to ſtone-walls, on which were raiſed breaſt-works, behind which they made uſe of their darts and arrows in ſecurity. Modern fortification, is that which is flanked and defended by baſtions and out-works, the ramparts of which are ſo ſolid, that they cannot be beat down but by the continual fire of ſeveral batteries of cannon.

Regular fortification, is that built in a regular polygon, the ſides and angles of which are all equal, being commonly about a muſket-ſhot from each other.

Irregular fortification, on the contrary, is that where the ſides and angles are not uniform, equidiſtant, or equal; which is owing to the irregularity of the ground, valleys, rivers, hills, and the like.

The principal maxims of fortification are theſe: 1. That every part of the works be ſeen and defended by other parts, ſo that the enemy can lodge no where without being expoſed to the fire of the place. 2. A fortreſs ſhould command all places round it; and therefore all the out-works ought to be lower than the body of the place. 3. The works fartheſt from the center, ought always to be open to thoſe more near. 4. No line of defence ſhould exceed a point-blank muſket-ſhot, which is about an hundred and twenty, or an hundred and twenty-five, fathoms. 5. The more acute the angle at the center is, the ſtronger will be the place. 6. In great places, dry trenches are preferable to thoſe filled with water, becauſe ſallies, retreats, and ſuccours are frequently neceſſary; but, in ſmall fortreſſes, water-trenches, that cannot be drained, are beſt, as ſtanding in need of no ſallies, &c.

Marine FORTIFICATIONS. Though theſe have nothing peculiar in them, yet it may not be improper to give ſome directions with relation to batteries. 1. In raiſing batteries to hinder a deſcent, care ſhould be taken to diſpoſe them in ſuch places where the deſcent is moſt eaſy; and the guns ſhould be ſo levelled as to ſcour the ſurface of the water, that they may fire effectually upon the boats as they approach. 2. It is likewiſe convenient to have batteries to play upon places where there is good anchorage; and theſe ſhould be ſomewhat more elevated than the former. 3. It is alſo neceſſary to erect batteries at the entrance of roads; and theſe ought to be ſo made, as to diſcover ſhips at a diſtance. 4. It is very neceſſary that theſe batteries ſhould be defended by ſome works, againſt attacks; and, if poſſible, ſhould be under the fire of the place; or, at leaſt, they ought not to be too far advanced.

FORTIN, FORTLET, or *Field*-FORT, a ſconce or little fort, whoſe flanked angles are generally diſtant one from another an hundred and twenty fathoms.

FORTISSIMO, in muſic, ſometimes denoted by FFF, or *fff*, ſignifies to ſing or play very loud or ſtrong.

FORTUNE, *Fortuna*, a goddeſs worſhipped with great devotion by the ancient Greeks and Romans, who believed her to preſide over human affairs, and to diſtribute wealth and honour at her pleaſure.

FORUM, in Roman antiquity, a public ſtanding place within the city of Rome, where cauſes were judicially tried, and orations delivered to the people.

FOSS, or FOSSA, in anatomy, a kind of cavity in a bone, with a large aperture, but no exit or perforation.

Foſs is particularly uſed for the cavity, or indenture, in the back part of the neck.

FOSSA MAGNA, the interior cavity, or rima magna, of the pudendum muliebre. Bartholin calls it foſſa navicularis.

FOSS, in fortification, a hollow place, commonly full of water, lying between the ſcarp and counterſcarp, below the rampart; and turning round a fortified place or a poſt that is to be defended. See MOAT.

FOSS-WAY, one of the four principal high-ways of England, that anciently led through the kingdom; ſuppoſed to be made by the Romans, having a ditch upon one ſide thereof.

FOSSIL, in natural hiſtory, denotes, in general, every thing dug out of the earth, whether they be natives thereof, as metals, ſtones, ſalts, earths, and other minerals; or extraneous, repoſited in the bowels of the earth by ſome extraordinary means, as earthquakes, the deluge, &c.

FOVEA Cordis, in anatomy, the pit of the heart, or rather of the ſtomach.

FOUGADE, or Fougasse, in the art of war, a little mine, about eight or ten feet wide, and ten or twelve deep, dug under ſome work or poſt, which is in danger of falling into the enemy's hands, and charged with ſacks of powder, covered with ſtones, earth, and whatever elſe can make great deſtruction. It is ſet on fire like other mines, with a ſauciſſe.

FOUL, in the ſea-language, entangled or embarraſſed: foul anchor, i. e. an anchor which has either hooked its own or ſome other cable, wreck, rocks, &c. "a ſhip ran foul of us in the night," i. e. came cloſe to our ſhip, entangling herſelf amonſt our rigging.

Foul-Bottom is when the bottom of a ſhip is covered with ooze, graſs, ſhells, or other excrements.

Foul-Hawse is when the ſhip, being moored by two anchors, has turned round, and conſequently twiſted one cable about the other.

Foul-Wind, a wind which blows contrary to the ſhip's courſe.

FOULNESS, in ſurgery, a term applied to wounds, where the fleſh is putrid, fungous, black, or livid.

FOUNDATION, in architecture, is that part of a building which is under-ground.

Foundations are either natural or artificial. Natural, as when a building is erected upon a rock, or very ſolid earth, in which caſe we need not ſeek for any farther ſtrengthening; for theſe, without digging, or other artificial helps, are of themſelves fit to uphold the greateſt buildings. But if the ground be ſandy, or marſhy, or hath lately been dug, recourſe muſt be had to art. If the ground be ſandy or marſhy, you muſt dig till you find ſound ground, and the beſt is that which requires moſt labour in cutting, and when wet does not diſſolve into dirt. If the earth to be built upon is very ſoft, as in mooriſh grounds, lay good pieces of oak, whoſe length muſt be about the breadth of the trench, or two feet longer than the breadth of the wall, acroſs the foundation, about two feet aſunder, and being well rammed down, lay long planks upon them, pinning or ſpiking down each plank to the pieces of oak on which it lies. But if the ground be very bad, let piles of oak, of a diameter about one-twelfth part of their length, be drove down to reach the good ground, and placed as cloſe as one can ſtand by another; then ſpike down long planks upon them. And it muſt not be forgot to place the piles, not only under the outer walls, but alſo under the inner walls that divide the building; for if theſe ſhould ſink, it would make the outer wall crack, and ſo ruin the whole building. If the ground be faulty here and there, let arches be turned over the faulty places, which will diſcharge them of the weight. As to the rules neceſſary to be obſerved in the ſubſtruction or artificial part of the foundation, they are theſe: 1. That the bottom of the trench be made exactly level. 2. That the loweſt ledge or row be all of ſtone (the broader the better) laid cloſe together. 3. That the breadth of the ground-work be at leaſt double that of the wall to be raiſed on it. However, the breadth may be regulated according to the goodneſs of the ground, and the weight of the intended edifice. 4. That the foundation be made to diminiſh as it riſes, taking care, however, that it do ſo equally on both ſides. 5. That you ought never to build on the ruins of an old foundation, unleſs well aſſured of its depth and ſtrength to bear the ſuperſtructure. 6. And laſtly, The ſtones in a foundation ſhould be laid as they naturally lay in the quarry; a precept generally obſerved by all good architects, becauſe they find the ſtones are ſubject to cleave that way of the grain that lay horizontally in the quarry. In ſome places buildings near the water are founded on ſacks of wool laid like matreſſes, which being well preſſed and greaſy, will never give way, nor rot in the water.

Foundation *of Bridges* is laid after different manners. The firſt is by incloſing all the round ſpace of ground you would build upon, by dams made with piles ſet deep in the ground in double rows, well ſtrengthened and bound together with croſs pieces and cords, and filling the vacant ſpaces between them with chalk or other earthy matter. This being done, the water muſt be emptied out, and the foundation dug according to the quality of the ground, driving down piles, if it be neceſſary, upon which the walls of the foundation muſt be laid. But this method is only practicable in building on ſuch rivers, where the water is neither very rapid, nor very deep. The ſecond is done by laying the foundation on grate-work, rafts of ſtout oak well bound together, and made faſt at the ſurface of the water with cables or machines, and building upon them large quarters of ſtone, cramped together, and joined with good mortar, or cement, and afterwards letting them deſcend ſoftly by theſe cables and machines perpendicularly to the bottom of the water. This was the method practiſed in laying the foundation of Weſtminſter bridge, the grating being made of the bottom of a frame called by the French *caiſſon*, the ſides of which were ſo contrived that they might be taken off, after a pier was finiſhed.

ed. The third is by drawing off all, or the greateſt part of the water of the river into ſome other place; and this was done at London-Bridge, if we could believe Stow, who alledges, that during the time of building, the river was turned from Batterſea to Rotherhith; but this is not warranted.

Foundation denotes alſo a donation or legacy either in money or lands, for the maintenance and ſupport of ſome community, hoſpital, ſchool, lecture, &c.

FOUNDAY, in metallurgy, a term uſed by the workers at the iron-mines in many counties in England, for the ſpace of ſix days, in which time they continue to make a determinate quantity of iron; ſo that they count their work by theſe foundays, or weeks.

FOUNDER, in a general ſenſe, the perſon who lays a foundation, or endows a church, ſchool, religious houſe, or other charitable inſtitution. The founder of a church may preſerve to himſelf the right of patronage, or preſentation to the living.

Founder alſo implies an artiſt who caſts metals, in various forms, for different uſes, as guns, bells, ſtatues, printing characters, candleſticks, buckles, &c. whence they are denominated gun-founders, bell-founders, figure-founders, letter-founders, founders of ſmall works, &c. See Foundery.

Founder, in glaſs-making, a term appropriated to the crown and green glaſs, and is the perſon there, who in the ſame office in the white-glaſs making is called conciator.

FOUNDERING, in the menage, a diſorder in horſes, of which there are two kinds, viz. in the feet and in the cheſt.

Foundering in the feet, is an univerſal rheumatiſm, or defluction of humours upon the ſinews of a horſe's feet, which cauſes ſo great a ſtiffneſs in the hoofs, that the horſe has no ſenſe or feeling of them.

This diſorder ariſes from hard riding; from great heats and colds; and is ſometimes occaſioned by watering a horſe when he is very hot, by which means, as the farriers term it, his greaſe is melted within him; alſo by wearing too ſtreight a ſhoe, or travelling upon hard ground.

The general methods of curing this diſtemper are, firſt to pare all the horſe's ſoles ſo thin, that you may ſee the quick: then bleed him well at every toe; ſtop the vein with tallow and roſin; and having tacked hollow ſhoes on his feet, ſtop them with bran, tar, and tallow, as boiling hot as may be; and this renew once in two days for a week together, after which, let him have good exerciſe, &c. or, after he is pared thin, and let blood at his toes, ſtop his feet with cow's dung, kitchen-fee, tar, and ſoot, boiled together, and poured boiling-hot into them.

Foundering in the cheſt may proceed from crudities in the ſtomach, or other infirmities, obſtructing the paſſages of the lungs; and may be diſcovered by the horſe's not being able to bow his joints; and being once laid, he cannot riſe again; his legs ſwell, &c.

As a particular remedy for cheſt-foundering, take five or ſix pennyworth of oil of peter, and mingle it with an equal quantity of ale, or beer: then rub this mixture with your hand on the part affected; and cauſe a red-hot fire-ſhovel to be held before it during the application.

Foundering, among ſailors, ſinking in a ſtorm at ſea.

FOUNDERY, or Foundry, the art of caſting all ſorts of metals, into different forms. It likewiſe ſignifies the work-houſe, or ſmelting-hut, wherein theſe operations are performed.

FOUNT, or Font, among printers, a ſet or quantity of letters, and all the appendages belonging thereto, as numeral characters, quadrates, points, &c. caſt by a letter-founder, and ſorted.

FOUNTAIN, *Fons*, a ſpring of living water that riſes out of the ground. See Spring.

Fountains or ſources of rivers were held ſacred among the ancients, and even worſhipped as a kind of divinity: and it was a point of religion, not to muddy the waters in bathing.

Artificial Fountain, or *jet d'eau*, a contrivance, whereby water is violently ſpouted upwards.

Some fountains are founded on the elaſticity of the air, and others on the preſſure of the water.

The artificial fountain (*fig.* 9.) which may be ſet up upon either of its ends, after it has played out all its water in a jet through the ſpouting-pipe E, plays again afreſh through the ſpout I, when you have turned it over like an hour-glaſs. The water contained in the cavity A F H runs down the curve pipe C D E, and ſpouts up through the jet E by the preſſure of the column of water C D. But, unleſs the pipe G F was open at G, to let the air run up to F, and preſs at top of the ſurface of the water in the cavity A, the water could not run down and ſpout at E. There is ſuch another pipe as G F at K, belonging to the cavity B, through which the water of the jet received in the baſon ſupplies the cavity B, whilſt the fountain ſtands on the end B: but, when the fountain is inverted, it ſupplies B with air to let the water deſcend in the direction G H I, I becoming the ſpouting pipe.

Upon theſe principles depend alſo the alternate running and ſtopping of the fountain at command (*fig.* 10.) C A E is a receptacle of water cloſe from the air's entrance, except through the pipe G F, when the cock C, by which it was filled, is ſtopped. There is another pipe E D H B, which goes from the bottom of the water to the jet B in the baſon D B, but is ſtopped by the cock H. At the loweſt part of the baſon D B there is a ſmall hole at I to let the water of the baſon D B run into the baſon,

baſon G H under it: there is alſo a ſmall triangular hole or notch in the bottom of the pipe F G at G. Turn the cock H, and the fountain will play ſome time; then ſtop, then play again alternately. The cauſe of playing and ſtopping is this; the water coming down the pipe E D H B would not come out at B, if the S ſ above the water were not ſupplied, as it dilated: now it is ſupplied by the pipe G F, which takes it in at the notch G, and delivers it out at F; but after ſome time the water which has ſpouted out at B, falling down into the baſon D B, riſes high enough to come above the notch G, which ſtops the paſſage of the air, ſo that the air S ſ above the water in the veſſel C A E cannot ſufficiently preſs for want of a ſupply, and the fountain ceaſes playing. Now the water of D B runs down into the lower baſon H G, through the hole I, till it falls below the top of the notch G, and then the air runs up into the upper receptacle again, and ſupplying the air at S ſ, the fountain plays again. This is ſeen a little before-hand by a ſkin of water on the notch G, before the air finds paſſage, and then you command the fountain to play. The hole I muſt be leſs than that of the jet, otherwiſe the water will all run out into the lower baſon, without riſing high enough to ſtop the notch G.

In the next fountain AB (*fig.* 11.) the air is condenſed at the top of the water by means of a ſyringe, ſometimes by blowing in; and the air and water are retained by the cock C, which muſt be opened, before it can play; then the water, ſtrongly preſſed by the condenſed air at S S, goes through the pipe *o* and the adjutage *b* with great force, in jets of ſeveral figures according to the ſpouting-pipes put on at *b*.

In the fountain (*fig.* 12.) the air, being compreſſed by the concealed fall of waters, makes a jet, which ſeen for a while is looked upon as a perpetual motion by the ignorant.

The boxes C E and D Y X being cloſe, you only ſee the baſon A B W, with a hole at W, into which the water ſpouting out at B falls; but that water, going down the hole W, does not come up again at W, but runs down through the pipe W X into the box D Y X, from whence it drives out the air through the aſcending pipe Y Z into the cavity of the box C E, where, preſſing upon the water that is in it, it forces it out through the ſpouting-pipe O B, as long as there is any water in C E: ſo that this whole play is only whilſt the water contained in C E, having ſpouted out, falls down through the pipe W X into the cavity D Y X. The force of the jet is proportional to the height of the pipe W X, or of the boxes C E and D Y X above each other, The height of the water, meaſured from the baſon A B W to the ſurface of the water in the lower box D Y X, is always equal to the height meaſured from the top of the jet to the ſurface of the water in the middle cavity at C E. Now ſince the ſurface C E is always falling, and the water in D Y always riſing, the height of the jet muſt continually decreaſe, till it is ſhorter by the height of the depth of the cavity C E, which is emptying, added to the depth of the cavity D Y, which is always filling; and, when the jet is fallen ſo low, it immediately gives over. In the figure the air is repreſented by points.

To prepare this fountain, which is generally done privately firſt, pour in water at W, till the cavity D X Y be full; then turn the fountain over, and the water will run from the cavity D X Y into the cavity C E, which is full, when the water runs out at B held down, Set the fountain up again as if nothing had been done to it. When you would make it play, pour in about a pint of water into the baſon A B W, and when the pipe W X is filled, the fountain will play, and continue ſo to do, as long as there is water in C E. You may pour the water left in the baſon A B W into any veſſel, and invert the fountain, which, when ſet upright, will be ſet a playing by putting back the water poured out into A B W; and ſo *toties quoties*.

FOURCHEE, or FOURCHY, in heraldry, an appellation given to a croſs forked at the ends.

FOURCHER, or FOURCHING, in law, ſignifies the delaying or putting off an action, which might have been brought to a determination in a ſhorter time.

FOURTH, in muſic, one of the harmonic intervals. It conſiſts in the mixture of two ſounds, which are in the ratio of 4 to 3; that is, of ſounds produced by chords, whoſe lengths are to each other as 4 to 3.

FOWL, among zoologiſts, denotes the larger ſort of birds, whether domeſtic or wild: ſuch are geeſe, pheaſants, partridges, turkies, ducks, &c.

FOX, *Vulpes*, in zoology, an animal of the dog-kind, which much reſembles the common dog in form, and is of the ſize of a ſpaniel: it is chiefly diſtinguiſhed by its long and ſtraight tail, with the tip white.

The fox is a native of moſt northern countries. That of Siberia is about the ſize of a common kind; but its head is larger, and its tail not only bigger and more buſhy, but all of one colour.

FOX-GLOVE, *Digitalis*, in botany, See DIGITALIS.

FRACHES, in glaſs-making, flat iron pans, wherein the new-made veſſels are put, to be removed gradually from the fire.

FRACTION, in arithmetic, or, as it is ſometimes called, a BROKEN NUMBER, is that which repreſents a part or parts of any thing propoſed, and is generally expreſſed by two numbers placed one above the other, with a line drawn between them:

$$\text{Thus}\left\{\begin{array}{l} \underline{3} \text{ is the numerator,} \\ 4 \text{ is the denominator,} \end{array}\right.$$

The denominator denoting how many parts the thing or unity is ſuppoſed to be divided into, and the numerator ſhews how many of theſe parts are contained in the fraction.

Again, fractions are of three ſorts, that is, vulgar, decimal, and algebraical, or literal.

1ſt. Decimal fractions, which is the moſt elegant and natural way of dividing unity, always ſuppoſes the integer divided into 10, 100, 1000, &c. accordingly as preciſeneſs in the operation is required: hence the denominator being known, needs not be expreſſed, but the fraction may be ſet down in the ſame manner as a whole number, only taking care to prefix its diſtinguiſhing point, or comma; ſo $\frac{5}{10}$ will be expreſſed by ,5, $\frac{5}{100}$ by ,05, and $\frac{75}{100}$ by ,75, &c.

2d. Vulgar fractions are of three ſorts, viz. ſimple or proper, improper, and compound: a ſimple, or proper fraction hath its numerator always leſs than its denominator, and conſequently the value of the fraction is always leſs than unity, as $\frac{3}{4}$, $\frac{11}{15}$, $\frac{25}{79}$, &c.

An improper fraction is that whoſe numerator is greater than the denominator; as, $\frac{5}{4}$, $\frac{19}{10}$, $\frac{340}{100}$, &c.

A compound fraction is one which has more numerators and denominators than one, and may always be diſtinguiſhed by the word *of* being put between them, as $\frac{2}{3}$ of $\frac{3}{4}$, $\frac{3}{4}$ of $\frac{6}{10}$ of $\frac{9}{12}$, &c. The formation of theſe fractions is eaſy, for 7 pence is eaſily known to be $\frac{7}{12}$ of a ſhilling; and one ſhilling is $\frac{1}{20}$ of a pound; therefore 7 pence is $\frac{7}{12}$ of $\frac{1}{20}$ of a pound. Numberleſs other examples might be given, but we apprehend the following will be ſufficient to ſhew the nature of them.

All compound fractions are reduced to ſingle ones, by the following

Rule.—Multiply all the numerators into one another for a numerator, and all the denominators into one another for the denominator.

Thus the $\frac{1}{3}$ of $\frac{3}{4}$ of $\frac{2}{5}$ will become $\frac{6}{60}$, or $\frac{1}{10}$.

For $1\times 3\times 2=6$, the numerator, and $3\times 4\times 5=60$, the denominator.

To alter or change different FRACTIONS *into one denomination retaining the ſame value.*—In order to gain a clear underſtanding of this propoſition, it will be convenient to premiſe this lemma, viz. If a number multiplying two numbers produce other numbers, the numbers produced of them ſhall be in the ſame proportion that the numbers multiplied are.

That is, if both the numerator and denominator of any fraction be equally multiplied into another number, their products will retain the ſame value with that fraction.

As in theſe $\frac{2\times 2}{3\times 2}=\frac{4}{6}$. Or, $\frac{2\times 3}{3\times 3}=\frac{6}{9}$. Or, $\frac{2\times 5}{3\times 5}=\frac{10}{15}$, &c.

That is, $\frac{2}{3}$ and $\frac{4}{6}$, or $\frac{2}{3}$ and $\frac{6}{9}$, or $\frac{2}{3}$ and $\frac{10}{15}$, are of the ſame value in reſpect to the whole or unit.

From hence it will be eaſy to conceive, how two or more fractions, that are of different denominations, may be altered or changed into others that ſhall have one common denominator, and ſtill retain the ſame value.

Example.—Let it be required to change $\frac{2}{3}$ and $\frac{3}{7}$ into two other fractions that ſhall have one common denominator, and yet retain the ſame value.

According to the foregoing lemma, if $\frac{2}{3}$ be equally multiplied by 7, it will become $\frac{14}{21}$, viz. $\frac{2\times 7}{3\times 7}=\frac{14}{21}$. Again, if $\frac{3}{7}$ be multiplied equally with 3, it will become $\frac{9}{21}$, viz. $\frac{3\times 3}{7\times 3}=\frac{9}{21}$. And by this means we have obtained two new fractions, $\frac{14}{21}$ and $\frac{9}{21}$, that are of one denomination, and the ſame value with the two firſt propoſed, viz. $\frac{14}{21}=\frac{2}{3}$, and $\frac{9}{21}=\frac{3}{7}$. And from hence ariſes the general rule for bringing all fractions into one denomination.

Rule.—Multiply all the denominators into each other for a new and common denominator; and each numerator into all the denominators except its own, for new numerators.

Example.—Let the propoſed fractions be $\frac{1}{3}$, $\frac{2}{5}$, $\frac{3}{4}$, and $\frac{6}{7}$.

Then $3\times 5\times 4\times 7=420$, the new and common denominator: alſo $1\times 5\times 4\times 7=140$, $2\times 3\times 4\times 7=168$, $3\times 3\times 5\times 7=315$, and $6\times 3\times 5\times 4=360$, the new numerators. Hence 420 is the common denominator; and 140, 168, 315, 360, are the new numerators; and, conſequently, $\frac{140}{420}$, $\frac{168}{420}$, $\frac{315}{420}$, $\frac{360}{420}$, are the new fractions required.

To bring mixed numbers into FRACTIONS, *and the contrary.*—Mixed numbers are brought into improper fractions by the following

Rule.—Multiply the integers, or whole numbers, with the denominator of the given fraction, and to their product add the numerator of the fraction required.

Thus, $9\frac{4}{5}$ will become $\frac{49}{5}$; and $7\frac{6}{7}=\frac{54}{7}$.

To abbreviate or reduce FRACTIONS *into their loweſt or leaſt denomination.*

Rule.—Divide the greater number by the leſſer, and that diviſor by the remainder, if their be any, and ſo on continually, until there be no remainder left; then will the laſt diviſor be the greateſt common meaſure; and, if it happen to be 1, then are thoſe numbers prime numbers, and are already in their loweſt terms; but, if otherwiſe, divide the numbers by that laſt diviſor, and their quotients will be their leaſt terms required.

Example.—Let it be required to find the greateſt common meaſure of 72 and 108, viz. of $\frac{72}{108}$.

72) 108 (1
72
36) 72 (2
72
(0)

Here, becauſe there is no remainder, 36 is the greateſt common meaſure.

Then $72 \div 36 = 2$, the numerator; and $108 \div 36 = 3$, the denominator: therefore $\frac{72}{108}$ is abbreviated to $\frac{2}{3}$, the loweſt terms.

Algebraical fractions are ſet down in every reſpect, and alſo managed in the ſame manner, as vulgar fractions; therefore, if vulgar fractions are well underſtood, theſe will be very eaſy; for, $\frac{a-b}{a}$, $\frac{a+b}{a}$, and $\frac{a}{b}$ of $\frac{a-b}{aa}$, are algebraic fractions which differ not in the leaſt from vulgar ones in their nature and management.

For *Addition*, *Subtraction*, and *Multiplication* of FRACTIONS, See the articles ADDITION, SUBTRACTION, &c.

FRACTURE, in ſurgery, a rupture of a bone; or a ſolution of continuity in a bone, when it is cruſhed or broken by ſome external cauſe.

The word is Latin, *fractura*, and derived from *frango*, to break.

In curing fractures, the principal concern ſhould be the agglutination of the bone: take care, therefore, 1. that it is reduced to its proper ſituation, and this is done by extenſion and repoſition; 2. after reduction, apply a proper bandage, and preſcribe reſt to your patient; 3. prevent, or remedy, the inconveniencies that may enſue, and the ſurgeon will be qualified for this, if he knows, 1. how the bones are ſituated, whether there are one or more in the limb, whether they are large or ſmall, robuſt or ſpongy, even or uneven, and whether one or more be fractured; 2. what muſcles are near, with their poſition and office; 3. Whether any of the larger nerves, veins, or arteries, are near; for a thorough knowledge of theſe things conduces very much to a ſucceſsful cure.

When the fractured bones continue in their natural poſition, a proper bandage will promote the agglutination of the fragments, without repoſition or extenſion; though, as often as they recede from each other, ſome degree of extenſion is abſolutely neceſſary, which muſt always be proportioned to the diſtortion of the fragments; for the wider the ſeparation and the ſhorter the limb, from a contraction of the muſcles, the greater extenſion is required. But this operation muſt be performed tenderly, leſt too great violence ſhould injure the patient.

In extending a fractured limb, care is to be taken, 1. that the patient is kept ſteady, to prevent his giving way to the extenſion. The poſture muſt be accommodated to the circumſtances; for ſometimes ſitting in a chair, or on the floor, ſometimes lying on a bed, or table, is more commodious. 2. The broken limb, both above and below the fracture, muſt be held by an aſſiſtant. 3. The aſſiſtant who holds the lower part, muſt extend it with ſtrength ſufficient to replace the fragments; but, if the hands alone are not ſufficient, uſe a rope or napkin; and if one man is not enough, employ two or three. Obſerve always to proceed with tenderneſs, that you may not rack the patient with unneceſſary tortures.

There remains one very important obſervation relative to the extenſion of fractured bones, which is, that if the ſurgeon is called in after tumours, or violent inflammations come on, he ought to defer the extenſion, till they are removed; for, under theſe circumſtances, the parts affected cannot be handled, compreſſed, or extended, without much acute pains, convulſions, and the danger of a ſphacelus: but if the tumor or inflammation are ſlight, we may eaſily proceed to extenſion directly, in order to prevent their increaſe.

FRÆNUM, in anatomy, a term applied to ſome membranous ligaments of the body. As,

FRÆNUM LINGUÆ, the ligament under the tongue; which ſometimes ties it down too cloſe to the bottom of the mouth, and then requires to be inciſed or divided, in order to give this organ its proper and free motion. This diſorder generally ariſes in infants ſoon after their birth, ſo that they cannot move and exert their tongues in the action of ſucking: though it is ſometimes alſo obſerved in adults.

Each of the lips has alſo its peculiar frænum: the upper one under the noſe; the under one near the roots of the dentes inciſores: theſe are of the utmoſt ſervice to us in ſpeaking, and eating and drinking.

FRÆNUM PENIS, a ligament of the penis, that ties the prepuce to the lower part of the glans of the penis. See PENIS.

There is alſo a ſmall frænum of the clitoris, by which it is connected to the oſſa pubis. See the article CLITORIS.

FRAGARIA, the ſtrawberry, in botany. See the article STRAWBERRY.

FRAIL, a baſket made of ruſhes, or the like, in which are packed up figs, raiſins, &c. It ſignifies alſo a certain quantity of raiſins, about ſeventy-five pounds.

FRAISE, in fortification, a kind of defence, conſiſting of pointed ſtakes, ſix or ſeven feet long, driven parallel to the horizon into the retrenchments of a camp, a half-moon, or the like, to prevent any approach or ſcalade.

Fraiſes differ from paliſades chiefly from this, that the latter ſtand perpendicular to the horizon, and the former jet out parallel to the horizon, or nearly ſo, being uſually made a little ſloping, or with points hanging down. Fraiſes are chiefly uſed in retrenchments and other works thrown up of earth; ſometimes they are found under the parapet of a rampart, ſerving inſtead of the cordon of ſtone uſed in ſtone works.

To FRAISE *a Battalion*, is to line the muſqueteers round with pikes, that, in caſe they ſhould be charged with a body of horſe, the pikes being preſented, may cover the muſquetteers from the ſhock of the horſe, and ſerve as a barricade.

FRAME, in joinery, a kind of caſe, wherein a thing is ſet or incloſed, or even ſupported, as a window-frame, a picture-frame, &c.

Frame is alſo a machine uſed in divers arts; as,

Frame, among printers, is the ſtand which ſupports the caſes. See the article Case.

Frame, among founders, a kind of ledge incloſing a board, which, being filled with wetted ſand, ſerves as a mould to caſt their works in.

Frame is more particularly uſed for a ſort of loom, whereon artificers ſtretch their linens, ſilks, ſtuffs, &c. to be embroidered, quilted, or the like.

Frame, among painters, a kind of ſquare, conſiſting of four long ſlips of wood joined together, whoſe intermediate ſpace is divided by threads into ſeverel little ſquares like a net; and hence ſometimes called reticula. It ſerves to reduce figures from great to ſmall; or, on the contrary, to augment their ſize from ſmall to great.

FRAMING, a term uſed among gardeners, for the boxes and lights which cover the plants raiſed on common hot-beds.

Framing *of an Houſe*, among carpenters, denotes all the timber-work therein; namely, the carcaſe, flooring, partitioning, roofing, cieling, beams, aſhlering, &c. all together.

FRANCHISE, in a general ſenſe, a privilege or exemption from ordinary juriſdiction; as that for a corporation to hold pleas among themſelves to ſuch a value, or the like.

Franchise is ſometimes uſed for an immunity from a tribute, in which ſenſe it is either perſonal or real; that is, belonging to a perſon immediately, or elſe by means of this or that place of which he is chief, or a member.

Franchise is alſo uſed for an aſylum or ſanctuary, where people are ſecure of their perſons. See Asylum.

FRANCISCAN Monks, Friars-Minor, or Grey-Friars, religious of the order of St. Francis; founded by him in the year 1209.

FRANGULA, black berry bearing alder, in botany, a plant with a woody ſtem, with many irregular branches covered with a dark bark; theſe are furniſhed with oval ſpear-ſhaped leaves. The flowers are produced in cluſters at the ends of the former year's ſhoots; theſe are very ſmall, erect, and apetalous, of an herbaceous colour, and contains five ſtamina. The flowers are ſucceeded by ſmall round berries, which are firſt red, but when ripe turn black. It flowers in June, and the berries ripen in September.

FRANKENIA, in botany, a genus of plants whoſe flower contains five petals, with a plane border and ſix filaments, topped with twin antheræ. The fruit is an oval, unilocular, and trivalvular capſule, containing a great many ovated very ſmall ſeeds.

FRANK Language, or Lingua Franca, a kind of jargon ſpoken in the Mediterranean, and particularly throughout the coaſts and parts of the Levant, compoſed of Italian, Spaniſh, French, vulgar Greek, and other languages.

Frank-law, a word applied to the free and common law of the land, or the benefit a perſon has by it.

Frank-pledge, in our law, ſignifies a pledge or ſurety for the behaviour of freemen.

Frankincense, *Thus*, in the materia medica. See the article Thus.

FRANKS, Frankis, or Franquis, an appellation given by the Turks, and other nations of Aſia, to all the inhabitants of the weſtern parts of Europe, to which they give the name of Frankiſtan.

FRAPPING, among ſailors, the act of croſſing and drawing together the ſeveral parts of a tackle, or other complication of ropes drawn tight to ſecure any body. The frapping always increaſes the tightneſs, or of courſe adds to the ſecurity acquired by the purchaſe.

Frapping *a Ship*, paſſing four, five, or ſix turns of a cable round the body or hull of a ſhip in the middle, to ſecure her in a great ſtorm, when it is apprehended ſhe has not ſufficient ſtrength to reſiſt the violent efforts of the waves: this expedient, however, is rarely put in practice, unleſs in very old ſhips, which the owners are willing to venture till the laſt.

FRATERNITY, in the Roman catholic countries, ſignifies a ſociety for the improvement of devotion.

Fraternity, in a civil ſenſe, a company or gild of certain artificers or traders. See the articles Company and Gild.

FRATRICELLI, Little Brothers, in church hiſtory, a ſect of heretics who appeared in Italy about the year 1298, and afterwards ſpread all over Europe. They wore the habit of the Franciſcan order, and pretended that eccleſiaſtics ought to have no poſſeſſions of their own.

FRATRIAGE, *Fratriagium*, the partition among brothers or coheirs, coming to the ſame inheritance or ſucceſſion.

FRATRICIDE, the crime of murdering one's brother. See Parricide.

FRAUD, in law, ſignifies deceit in grants or conveyances of lands, &c. or in bargains and ſales of goods, &c. to the damage of another perſon.

FRAXINELLA, in botany. See Dictamnus.

FRAXINUS, the aſh-tree, in botany. See the article Ash.

FREAM, a name given by farmers to ploughed lands worn out of heart, and laid fallow till it recovers. See Fallowing.

FRECKLES, *Lentigines*, in medicine, ſmall, yellowiſh, or duſky ſpots appearing on the ſkin, chiefly about the face, neck, and hands. It is moſtly a natural affection cauſed by the heat of the ſun, whereby ſome parts of the ſkin appear of a darker colour than uſual, called tan, ſunburn, and morphew, which differ only in degree, and uſually diſappear in winter.

Mr. Homberg's medicine, which is compoſed of bullock's gall mixed with alum, and after the alum is precipitated, expoſed three or four months in the ſun in a cloſe phial, is the beſt remedy.

FREE, in a general ſenſe, is uſed in oppoſition to whatever is conſtrained or neceſſiated. When applied to things endowed with underſtanding, it more peculiarly relates to the liberty of the will.

FREE-BENCH, ſignifies that eſtate in copyhold which the wife, being eſpouſed a virgin, has after the deceaſe of her huſband for her dower, according to the cuſtom of the manor.

FREE STATE, a republic governed by magiſtrates elected by the free ſuffrages of the inhabitants.

FREE-STONE, a whitiſh ſtone dug up in many parts of England, that works like alabaſter, but is more hard and durable; being of excellent uſe in building, &c. It is a kind of a grit ſtone, and is called free, from its being of ſuch a conſtitution as to cut freely in any direction: ſuch is the Portland-ſtone, and the free-ſtone of Kent.

FREE-THINKER. See the article DEIST.

FREE-WARREN, the power of granting or denying licence to any one to hunt in ſuch and ſuch ground.

FREE *the Boat*, or bale the boat, among ſailors, throw out the water.

FREEDOM, in general, the ſtate or quality of being free.

FREEDOM *of a Corporation*, the right of enjoying all the privileges and immunities belonging to it.

FREEDOM *of the Will*, that power or faculty of the mind, whereby it is capable of acting, chuſing, or rejecting, whatever it judges proper.

FREEDOM *of Contrariety*, among moraliſts, that of chuſing either of two oppoſites, as virtue or vice, good or evil; concerning which the received doctrine is, that mankind have a freedom of contradiction, but not of contrariety; that is, they may abſtain from the purſuit of virtue and good, but are incapable of hating them, or of preferring their oppoſites.

FREEZE, or FRIEZE, in architecture. See the article FRIEZE.

FREEZE, or FRIEZE, in commerce, a coarſe kind of woollen ſtuff, or cloth, for winter wear; ſo called, as being freezed or napped on one ſide.

FREEZING, in natural philoſophy, the ſame with CONGELATION, which ſee.

The principle which authors have gone upon, in order to ſolve the phænomena of freezing, are either, firſt, according to Gaſſendus, that ſome foreign matter is introduced into the pores of the fluid, by means whereof its bulk is increaſed, and its parts become fixed.

And theſe gentlemen, to ſolve it, apply to certain nitrous particles, properly formed to produce this effect; in regard ſal ammoniac, ſaltpetre, ſalt of urine, and many other volatile and alkalizate ſalts, mixed with water, increaſe its degree of cold very ſenſibly. And the manner in which theſe particles are preſumed to hinder the fluidity of water is, that they are conſtituted of rigid pointed ſpicula, eaſily, they ſay, driven into the globules of water, which, being variouſly mingled, and as it were intangled together, by degrees enfeeble, and finally deſtroy the motion thereof.

Secondly, the followers of Des Cartes aſſert, that ſome matter, naturally contained in the fluid, is by an intenſe degree of cold expelled, through the abſence of which, the body becomes fixed. And this they preſume to be brought about by the receſs of the active, ætherial matter, to which they aſcribe all motion of bodies, out of the pores of the water, or at leaſt to a very large abatement of it. And conſidering the known phænomena of the freezing of the natural fluids (the attraction and repulſion of whoſe parts in a ſtate of fluidity are pretty near equal, and therefore eaſily moved one among another; as alſo from the melting of ſuch as are only reduced to a ſtate of fluidity by heat, the parts being put under a degree of extraordinary vibration, which by cold again becomes rigid, wherein the attraction of their parts ſeems greatly to overpower that of their repulſion; whence proceeds what we call coheſion, tenacity, viſcidity, and the like) we cannot refute either of the ſyſtems abovementioned, ſince neither of them at preſent come under proof by any experiment: they are therefore purely hypothetical.

But the third opinion on this ſubject, according to a late French author, is, that there is ſome alteration produced in the texture or form either of the fluid particles, or of ſomething contained in them.

In favour of this laſt, it may be obſerved, that a globule of water held on the point of a needle, in a ſmart froſt, will, upon freezing, ſhoot itſelf out into a ſtar, having a certain number of points; and ſnow, which is a frozen vapour, ſeems to be no more than a congeries of theſe ſtars, united to each other by the tips of thoſe points, and by no means adapting themſelves to, or filling the interſtices between them: it muſt therefore follow, that the dimenſions of a quantity of water, reduced thus by cold from a fluid to a fixed ſtate, will be conſiderably enlarged.

FREEZING, in naval affairs, a ſort of ornamental painting, conſiſting of trophies, flower-work, &c.

on a ſhip's quarter, ſtern, or fore part immediately below the upper-edge of her ſides, called the gunnel.

Friezing-Mixture, a compoſition of ſnow, or ice pulverized, mixed with nitre, or any other penetrating ſalt, which will cauſe ſo intenſe a degree of cold, as to fix or congeal the mercury in the thermometer. See Cold.

FREIGHT, or Fraight, in navigation and commerce, the hire of a ſhip, or a part thereof, for the conveyance and carriage of goods from one part or place to another; or the ſum agreed on between the owner and the merchant, for the hire and uſe of a veſſel.

Freight, is alſo uſed for the burden or lading of a ſhip, or the cargo of goods, &c. which ſhe has on board.

Freight alſo ſignifies a duty of fifty ſols per tun, paid to the crown of France by the maſters of foreign veſſels going in or out of the ſeveral ports of that kingdom.

FRENUM, or Frænum, in anatomy. See Frænum.

FRENZY, or Phrenzy, in medicine. See the article Phrenzy.

FRESCO, a method of painting in relievo on walls, ſo as to endure the weather.

It is performed with water-colours on freſh plaiſter; or on a wall laid with mortar not yet dry. This ſort of painting has a great advantage by its incorporating with the mortar, and drying along with it, becomes very durable.

FRESHEN *the Hauſe*, among ſailors, when a ſhip rides at anchor, there is always ſome canvas, mat, leather, or ſuch like matter, wound about the cable in the hawſe-hole, and where it may rub againſt the ſtem: the matter uſed on this occaſion is called ſervice, and, as by the pitching and labouring of a ſhip in a ſtorm when ſhe is anchored in an open road or bay, the ſervice muſt be in a ſhort time wore through, it is neceſſary to have it frequently renewed for the preſervation of the cable, on which all depends; and this act of renewing the ſervice is called freſhening the hawſe, which is a circumſtance a ſeaman can never be too careful in obſerving. See the article Hawse.

FRESHES, among ſailors, the violence of an abb-tide, encreaſed by heavy rains, flowing into the ſea, which it diſcolours to a conſiderable diſtance from the ſhore on ſuch occaſions, where the line on which the two colours meet, may be diſtinctly obſerved for a conſiderable length along the coaſt.

FRET, or Frette, in architecture, a kind of knot or ornament, conſiſting of two liſts or ſmall fillets variouſly interlaced or interwoven, and running at parallel diſtances equal to their breadth.

Every return and interſection of theſe frets muſt be at right angles, otherwiſe they loſe all the beauty, and become perfectly Gothic. Sometimes the fret conſiſts but of a ſingle fillet, which, if well diſpoſed, may be made to fill its ſpace exceeding well. Frets were very much uſed by the ancients, eſpecially on even flat members, or parts of a building, as the faces of the corona, and eves of corniches; under the roofs, ſoffits, &c. and on the plinths of baſes. See the articles Corona, Eve, &c.

Fret, in heraldry, a bearing compoſed of ſix bars, croſſed, and variouſly interlaced; ſome call it the true lover's knot.

Fret, in muſic, ſignifies a kind of ſtop on ſome inſtruments, particularly baſs-viols and lutes. Frets conſiſt of ſtrings tied round the neck of the inſtrument, at certain diſtances, within which ſuch and ſuch notes are to be found.

Fret-work, that adorned with frets. It is ſometimes uſed to fill up and enrich flat empty ſpaces; but is moſtly practiſed in roofs, which are fretted over with plaiſter-work. The Italians alſo uſe fretworks in the mantling of chimneys with great figures; a cheap piece of magnificence, and as durable almoſt within doors, as harder matters in the weather.

FRETTY, in heraldry, an appellation given to bearings made up of ſix, eight, or more bars laid acroſs each other, in the manner of frets.

FRIABLE, among naturaliſts, an appellation given to bodies that are eaſily crumbled to pieces: ſuch are the free-ſtone, pumice-ſtone, &c.

FRIAR, or Frier, from the French *frere*, a brother, a term common to monks of all orders, founded on this, that there is a kind of fraternity, or brotherhood, between the ſeveral religious perſons of the ſame convent or monaſtery.

Friar's Coul, in botany, a name given to ſeveral ſpecies of arum. See the article Arum.

FRICTION, the rubbing or chafing of the ſurface of one body againſt another: thus when one body inſiſts on another upon an horizontal plane, it preſſes it with all its weight, which being equally re-acted on (and therefore the whole effect of its gravity deſtroyed) by the plane, it will be abſolutely free to move in any lateral or horizontal direction by any the leaſt power applied thereto, provided both the touching ſurfaces be perfectly ſmooth or even.

But ſince we find no ſuch thing as perfect politure or evenneſs in the ſurfaces of bodies (at leaſt ſuch as are produced by art) but an evident roughneſs or unevenneſs of the parts in the ſurface, ariſing from the poroſity and peculiar texture of the body, it is eaſy to underſtand that when two ſuch ſurfaces come together, the prominent parts of the one will in ſome meaſure fall into the concave parts of the other, and therefore, when an horizontal motion is attempted in one, the fixed prominent parts of the other will give more or leſs reſiſtance to the moving ſurface, by holding and detaining its parts, which is what we call friction.

Now ſince any body will require a force proportional to its weight to draw it over a given obſtacle, it follows that the friction ariſing to the moving body will always be in proportion to its weight only, and not the quantity of the ſurface, by which it bears upon the reſiſting plane or ſurface. Thus if a piece of wood four inches wide, and one inch thick, be ground, and thereby made exactly fit to the ſurface of another fixed piece of the ſame wood, it will require the ſame weight to draw it along on the ſame, whether it be laid on its broad or narrow ſide.

For though on the broad ſide there be four times the number of touching particles (*cæteris paribus*) yet each particle is preſſed with but $\frac{1}{4}$ of the weight that thoſe are on the narrow ſide; and ſince four times the number multiplied by $\frac{1}{4}$ of the weight, is equal to $\frac{1}{4}$ of the number multiplied by four times the weight, it is plain the effect, that is the reſiſtance, is equal in both caſes, and ſo requires the ſame force to overcome it.

The reaſon why the friction is proportional to the weight of the moving body, is, becauſe the power applied to move the body muſt raiſe it in ſome meaſure upon and over the prominent parts of the ſurface on which it is drawn; and this motion of the body, as it is not upright, ſo it will not require a power equal to its whole weight; but being in the nature of the motion on an inclined plane, (ſince the body bears on the prominent parts all the while) the power which moves it will be proportional to but a part of its weight only; and this will vary with the various degrees of ſmoothneſs or aſperity between the rubbing ſurfaces, and the other concurring circumſtances.

We find by experiment, that a body A B C D (Plate LVI. *fig.* 1.) of wood, braſs, &c. laid on the ſurface E F G H, will be drawn along by the weight P, nearly equal to one third of its own weight; if the ſurfaces be hard and well poliſhed, it will be leſs than a third part; but if the parts be ſoft or rugged, it will be much greater. Thus alſo the cylinder of wood A B (*fig.* 2.) if very ſmooth, and laid on two well-poliſhed ſupporters C, D, (having been firſt oiled or greaſed) and then charged with the weight of two pounds in the two equal balls G, H, it will require an additional weight x (equal to about a third part of the two pounds) to give motion to, or overcome the friction of the ſaid cylinder.

Now this additional weight, as it cauſes a greater preſſure of the cylinder, will likewiſe encreaſe the friction, and therefore require the addition of another weight y, equal to the third part of its own; for the ſame reaſon the weight y will require another z, a third part leſs; and ſo on *ad infininum*. Hence upon ſuppoſition that the friction is preciſely equal to a third of the weight, the firſt weight with all the additional ones, viz. $2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}$, &c. will be a ſeries of numbers in geometrical progreſſion decreaſing. Now the ſum of all thoſe terms, except the firſt (i. e. the ſum of all the infinite number of additional weights $x+y+z$, &c.) is found (by a known theorem in arithmetic) to be equal to one pound. So that if the weight of the cylinder be inconſiderable, the way to overcome the friction would be to double the power G, or H, at once.

But though we may at a medium allow about a third part of the weight with which any ſimple machine is charged for the friction ariſing from thence, yet this is very precarious and ſeldom the caſe; for if A B C D (*fig.* 3.) be a piece of braſs of ſix ounces, and E F G H be alſo a plate of braſs, and both the ſurfaces well ground and poliſhed, the weight P, of near two ounces, will be required to draw along the body A C alone; but if A C be loaded with 6, 8, or 10℔. then a ſixth part of the weight will be ſufficient to draw it along the plane. If the plane be covered with a linen or woollen cloth, then a third, or half part, and ſometimes more, will be requiſite to draw it along on the plane.

Friction, in medicine, the rubbing a diſeaſed part, either with or without unguents, oils, &c. Dr. Cheyne greatly recommends friction with a fleſh-bruſh to perſons of weak nerves and ſedentary lives; by which means a full and free perſpiration would be promoted, and obſtructions removed, to the great relief of many valetudinarians.

FRIEZE, Freeze, or Frize, in architecture, a large flat face, or member, ſeparating the architrave from the corniche, being that part of the entablature between the architrave and corniche.

This member was by the ancients called zoophorus, becauſe it was commonly enriched with the figures of animals. The frieze is ſuppoſed to be deſigned to repreſent the heads of the tranſverſe beams, which ſuſtain the roof or covering.

In the Tuſcan order it is quite plain, but is enriched with triglyphs in the Doric; it is ſometimes made arched or ſwelling in the Ionic: in the Corinthian and Compoſite it is frequently joined to the architrave by a little ſweep, and ſometimes to the corniche; and in theſe richer orders, it is commonly adorned with ſculpture, figures, compartments, hiſtories, foliages, feſtoons, &c.

From the variety of their ornaments, friezes obtain various denominations.

Convex or *Pulvinated* Friezes, ſuch whoſe profile is a curve, the beſt proportion of which is when drawn on the baſe of an equilateral triangle.

In ſome the ſwelling is only at top, as in a conſole; in others at bottom, as in the balluſter.

Flouriſhed Friezes, ſuch as are enriched with rinds of imaginary foliages, as the Corinthian frize of the frontiſpiece of Nero: or with natural leaves, either in cluſters or garlands; or continued, as in the Ionic of the gallery of Apollo in the Louvre.

Hiſtorical FRIEZE, ſuch as are adorned with baſs-relievos, repreſenting hiſtory, ſacrifices, &c. as the arch of Titus at Rome.

Marine FRIEZES, ſuch as repreſent ſea-horſes, tritons, and other attributes of the ſea, as ſhells, baths, grottos, &c.

Ruſtic FRIEZES, ſuch whoſe courſes are ruſticated or emboſſed, as in the Tuſcan frieze of Palladio.

Symbolical FRIEZES, thoſe adorned with the attributes of religion, as the Corinthian of the temple behind the capitol at Rome, whereon are repreſented the inſtruments and apparatus of ſacrifice.

FRIGATE, in the marine, a light nimble ſhip, built for quick ſailing: frigates carry from twenty to thirty-eight cannon, and are eſteemed excellent cruiſers.

Formerly the name of frigate was only known in the Mediterranean, and given to a kind of long veſſel, which they made uſe of in thoſe ſeas, and went with ſails and oars. The Engliſh were the firſt who appeared on the ocean with thoſe ſhips; and fitted them for action as well as ſailing.

FRIGID, is applied to a jejune ſtile, that is unanimated by any ornaments, and conſequently without any force or vigour.

FRIGID ZONE, in geography. See the article ZONE.

FRIGORIFIC, in phyſiology, ſmall particles of matter, which, according to Gaſſendus and others, being actually and eſſentially cold, and penetrating other bodies, produce in them that quality which we call cold. See COLD.

FRIST, in the mercantile ſtyle, ſignifies ſelling goods upon credit, or truſt.

FRIT, in the glaſs manufacture, the matter or ingredients of which glaſs is to be made, when they have been calcined or baked in a furnace; or it is the calcined matter to be run into glaſs. See GLASS.

There are three kinds of frit; the firſt, that made for cryſtal; the ſecond, or ordinary frit, is that made for the common white or cryſtalline metal; and the third, that made for green glaſs.

The frit for cryſtal is made as follows: take two hundred pounds of tarſo, powdered fine, and ſifted; of the ſalt of polverine, one hundred and thirty pounds; mix them well together, and put them in the calcar, a ſort of oven, or reverberatory furnace, which ſhould firſt be well heated: here let them remain, baking, frying, and calcining, for five hours, during which, the workman keeps mixing them with a rake, to make them incorporate.

The ſecond, or ordinary frit, is made of bare aſhes of polverine, without extracting the ſalt from them.

The third, for green glaſs, is made of common aſhes, without any preparation.

It may be obſerved, that glaſs might be made by immediately melting the materials, without this calcining and making them into frit; but the operation would be much more tedious.

FRIZING *of Cloth*, a term in the woollen manufactury, applied to the forming of the nap of a cloth, or ſtuff, into a number of little hard burrs or prominences, covering almoſt the whole ground thereof.

Some cloths are only frized on the back-ſide, as black cloths; others on the right-ſide, as coloured and mixed cloths, rateens, baize, freezes, &c.

FROG, *Rana*, in zoology, a genus of amphibious animals, the body of which is broad and ſhort, without a tail, and furniſhed with four legs.

FROG, among farriers, the ſame with fruſh. See FRUSH.

FRONDES, among botaniſts, denote leaves conſiſting of ſeveral other leaves, and forming the whole of the plant; as is the caſe of the fern-kind, in which, the fructification being on the back of the leaves, the ſingle leaf makes the whole plant, and is called frondis, not folium.

FRONT *of a Battalion*, among military men, is the firſt rank, or file-leaders. It is likewiſe called the face or head of a battalion.

FRONT *of a Place*, or the TENAILLE, in fortification, all that is contained between the flanked angles of the two neighbouring baſtions, viz. the two faces, two flanks, and the curtain.

FRONT, in architecture, the principal face or ſide of a building, or that which is preſented to the chief aſpect or view.

FRONT, in perſpective, a projection or repreſentation of the face or forepart of an object, or of that part directly oppoſite to the eye, which is more uſually called the orthography. See ORTHOGRAPHY.

FRONTAL, in architecture, a little fronton, or pediment, ſometimes placed over a little door, or window.

FRONTAL, or FRONTLET, or BROW-BAND, is alſo uſed in ſpeaking of the Jewiſh ceremonies.

This frontal conſiſts of four ſeveral pieces of vellum, on each whereof is written ſome text of Scripture: they are all laid on a piece of calf's leather, with thongs to tie it by.

The Jews apply the leather with the vellum on their foreheads in the ſynagogue, and tie it round the head with the thongs.

FRONTALE, in medicine, a name for any external medicine, or topic, applied to the forehead: more particularly it means a refrigrating and hypnotic remedy, prepared of cold cephalics, bruiſed and tied up in a linen bag, four or five fingers breadth.

FRONTATED, a term uſed by botaniſts relating to the leaf of a flower, which grows broader and broader, perhaps terminating in a right-line: and is uſed in oppoſition to cuſpidated, that is, when the leaves of the flower end in a point.

FRONTIER, the border, confine, or extremity of a kingdom or province, which the enemies find in front, when they would enter the ſame: thus we ſay, a frontier town, a frontier province, &c. Frontiers were anciently called marches.

FRONTIS Os, in anatomy, called alſo os coronale, the bone of the forehead.

This is a bone of the cranium, of an irregular form, double in infants, but in adults uſually ſingle: ſometimes, however, it is divided in theſe into two parts down to the noſe. It is ſituated in the anterior part of the ſkull, and forms that part of the face which is called the forehead, from whence it has its name. Its figure is ſymmetrical, reſembling a large ſhell, almoſt round. See the article Skull.

FRONTISPIECE, in architecture, the portrait or principal face of a building. See Building.

Frontispiece is alſo uſed to ſignify an ornament fronting the title page of a book, which, in ſome meaſure, ſhould expreſs the ſubject treated of.

FRONTON, in architecture, the ſame with pediment. See the article Pediment.

FROST, in phyſiology, ſuch an exceſſively cold ſtate of the air, as converts watery fluids into ice. See the articles Freezing and Ice.

FROTH, a white light ſubſtance, formed on the ſurface of fluids, by vehement agitation; conſiſting of little ſphericles, or globules.

Froth-Spittle, or Cuckoo-Spittle, a name given to a white froth, or ſpume, very common in the ſpring, and firſt months of the ſummer, on the leaves of certain plants, particularly on thoſe of the common white field lychnis, or catch-fly, thence called by ſome ſpatling poppy.

All writers on vegetables have taken notice of this froth, though few have underſtood the cauſe or origin of it till of late; being formed by a little leaping animal, called by ſome, the flea-graſhopper; by applying its anus cloſe the leaf, and diſcharging thereon a ſmall drop of a white viſcous fluid, which, containing ſome air in it, is ſoon elevated into a ſmall bubble; before this is well formed, it depoſits ſuch another, and ſo on, till it is every way overwhelmed with a quantity of theſe bubbles, which form the white froth which we ſee.

FRUCTIFEROUS, ſignifies properly any thing that produces fruit; but, in a more large and figurative ſenſe, it is uſed by ſome, particularly lord Bacon, for ſuch experiments in natural philoſophy, as prove advantageous to the experimenter in point of gain or profit.

FRUCTIFICATION, among botaniſts, comprehends both the flower and fruit of plants which cannot be well ſeparated; for though the fruit does not ſwell and ripen till after the flower is fallen, its rudiment, or firſt beginning, is in the flower, of which it properly makes a part.

Linnæus defines the fructification to be a temporary part of vegetables allotted to generation, terminating the old vegetable and beginning the new: it conſiſts of ſeven principal parts, viz. 1. the calyx; 2. the corolla; 3. the ſtamina; 4. the piſtillum; 5. the pericarpium; 6. the ſemina, or ſeeds; 7. the receptacle. See them explained under their reſpective articles.

FRUGIVOROUS Birds are ſuch as feed on fruits, either wholly or in part.

FRUIT, in general, includes whatever the earth produces for the nouriſhment and ſupport of man and other animals, as herbs, grain, hay, corn, &c. See the articles Herb, Grain, &c.

Fruit more properly ſignifies the production of a tree or plant for the propagation or multiplication of its kinds; in which ſenſe the word includes all kinds of ſeeds with their furniture; but botaniſts uſually underſtand by it that part of a plant wherein the ſeeds are contained.

The fruit of plants is the product or reſult of a flower, or that for whoſe production, nutricion, &c. the flower was intended, and in all plants the eſſential parts of the fruit appear to be only continuations or expanſions of thoſe which are ſeen in the other parts of the tree, and have a communication with the remoteſt parts, that is, the ſame fibres which conſtitute the root, trunk, and boughs, are extended into the fruit itſelf.

Fruits being known by the different ſtructure or formation of their parts, botaniſts have therefore applied particular denominations to them, in order to render their deſcription more certain; as the nut, berry, pod, capſule, drupe, pomum, &c. See the articles Nut, Berry, &c.

Fruits are ſerviceable in guarding, preſerving, and feeding the incloſed ſeed; in filtrating the coarſer, more earthy, and ſtrong parts, of the nutritious juice of the plant, and retaining it to themſelves, ſending none but the moſt pure, elaborated, and ſpirituous parts to the ſeed, for the ſupport and growth of the tender, delicate embryo, or plantule therein contained.

The uſe of fruits might be rendered much more extenſive than it is: many fruits which do hurt when eaten raw, would make wines, equal in flavour to many of thoſe now obtained at a great expence from abroad; and lands, which are not fit for bearing corn, might be a proper ſoil for bearing corn might be a proper ſoil for trees and ſhrubs producing ſuch fruits.—Cherries properly managed make an excellent wine; and, as they are replete with juice, are therefore capable of producing large quantities: the muſſel-plumb, which grows wild, makes a very agreeable wine of conſiderable ſtrength, and, by diſtillation, affords a pleaſant brandy. Gooſeberry and currant wine, in particular, if kept to a proper age, is little inferior to the very high priced wines which our good friends of France ſupply us with.

Fruit Trees. See the articles Planting, Pruning, Grafting, &c. and alſo their reſpective names.

FRUITERY, a place for the keeping of fruit, a fruit-houſe, or fruit-loft. A fruitery ſhould be inacceſſible to any thing of moiſture, and ſhould be, as much as poſſible, ſo even to froſt.

FRUMENTACEOUS, a term applied, by botaniſts, to all ſuch plants as have a conformity with wheat, in reſpect of their fruits, leaves, ears, or the like.

FRUSH, or Frog, among farriers, a ſort of tender horn which ariſes in the middle of a horſe's ſole; and, at ſome diſtance from the toe, divides into two branches, running towards the heel, in the form of a fork.

The fruſh is a part of a horſe's foot, the top of which only ſhould be pared, and that every time the foot is pared, otherwiſe it is apt to corrupt.

FRUSTUM, in mathematics, a part of ſome ſolid body ſeparated from the reſt.

Frustum, of a pyramid, or cone, is a piece or part thereof cut off, generally by a line parallel to the baſe. The ſolidity of the fruſtrum of a ſquare pyramid may be found by the following theorem.

To the rectangle of the ſides of the two baſes add the ſum of their ſquares; that ſum being multiplied into one third of the fruſtum's height, will give its ſolidity.

The ſolidity of the fruſtum of a cone may be found by the following theorem.

To three times the rectangle of the two diameters add the ſquare of their difference; that ſum multiplied by the height will give the ſolidity.

FRUTICOSE Stalks, among botaniſts, thoſe with a hard woody ſubſtance. See Stalk.

FUCHSIA, in botany, a genus of plants whoſe flower conſiſts of a monopetalous funnel-ſhaped corolla, with four filaments topped with obtuſe antheræ; the fruit is a roundiſh berry, with four furrows and four cells, containing a number of ovated ſeeds, and placed in a double ſeries.

Of this genus there is but one ſpecies hitherto known, which is a native of the warm part of America, therefore requires a hot houſe in this climate to preſerve it.

FUCUS, in botany, a genus of ſubmarine plants belonging to the cryptogamia claſs of Linnæus.

The fucus conſiſts of a tough matter, formed into a kind of leaves, which have ſome appearance of fructification, in punctated tubercles, covering oblong veſicles, ſuppoſed by Linnæus to be male flowers; and ſmooth, roundiſh veſicles, hollow and interwoven with filaments, which appear to him to be female flowers.

There are a great many ſpecies of fucus with broader or narrower leaves, and other peculiarities; one of which, the broad-leaved, ſerrated fucus, grows to the height of ſix, eight, or more inches.

FUGITIVE, a perſon obliged to fly his country, or remove from a place where he had ſome abode, or eſtabliſhment, on account of his crimes, debts, or other occaſions.

FUGUE, in muſic, is when different parts of a muſical compoſition follow each other, each repeating what the firſt had performed.

There are three kinds of fugues; the ſimple, double, and counter.

Single, or *Simple* Fugue, is ſome point conſiſting of four, five, or more notes, begun by one ſimple part, and ſeconded by a ſecond, third, fourth, fifth, &c. if the compoſition conſiſt of ſo many; repeating the ſame or ſuch like notes, that is, in the ſame proportion, ſo that the ſeveral parts follow, or come in one after another, in the ſame manner; the leading part ſtill flying before thoſe that follow.

Fugue Double, or Fuga Doppia, is when two or more different points move together in a fugue, and are alternately mixed and interchanged by the ſeveral parts.

FULCRUM, in mechanics, the prop or ſupport by which a lever is ſuſtained. See the article Lever.

FULICA, the coot, in ornithology, a genus of birds, of the order of the gallinæ, with a naked or bald forehead, and divided or cloven feet: add to this, that all the toes are longer than in whole-footed birds, and have ſemicircular membranes affixed to their joints.

FULIGINOUS, whatever proceeds from a thick, ſooty ſmoke, ſuch as litharge and lamp-black.

FULL-Moon, *plenilunium*, that phaſis of the moon when, in her oppoſition to the ſun, the whole of her diſk is illuminated; in which time eclipſes of the moon can only happen. See the articles Moon and Eclipse.

FULLER, a workman employed in the woollen manufactories, to mill, or ſcour, cloths, ſerges, and other ſtuffs, in order to render them more thick, compact, and durable. See Cloth.

Fuller's Earth, *cimolia purpuraſcens*, a kind of marle of a cloſe texture, and of a tolerable ſmooth and gloſſy ſurface, when it has been rubbed. It is extremely ſoft and unctuous to the touch, of a greyiſh brown colour, with ſome admixture of the olive or greeniſh.

The fineſt fuller's earth in the world is dug in England, and all the nations round us would gladly purchaſe it at a great price, were the exportation of it allowed; but one of the great advantages of our woollen manufactory is the keeping it at home. Large quantities of it are dug near Wooburn in Bedfordſhire; there are alſo pits of it in Surry, and ſome other counties; and ſtrata in many places, where it would be very well worth the proprietors while to have it dug, though at preſent it is neglected.

It is of great uſe in ſcouring cloths, ſtuffs, &c. as it imbibes all the oil and greaſe uſed in dreſſing the wool.

Fuller's Weed, in botany, a name ſometimes given to the dipſacus, or teaſel. See Dipsacus.

FULLING, the art or act of ſcouring and preſſing cloths, ſtuffs, ſtockings, &c. to cleanſe, thicken, and render them more firm and ſtrong, which is done by means of a water-mill.

In the troughs of the mill are laid the cloths, ſtuffs, &c. intended to be fulled: then letting the current of water fall on the wheel, the mallets are ſucceſſively let fall upon them, when by their weight and velocity they ſtamp and preſs the ſtuffs very ſtrongly, which by this means becomes thickened and condenſed.

In this operation, fullers earth is uſed with ſome proportion of ſope; but ſope alone would do much better, was it not dearer than fuller's earth.

Fulling of ſtockings, caps, &c. is performed either with the hands or feet, or a kind of wooden machine, either armed with wooden teeth, or thoſe of horſes or bullocks. The ingredients generally uſed on this occaſion are fuller's earth, urine, white and green ſope; but water ſoftened with chalk is far preferable.

The following is Mr. Colmet's method of fulling with ſope, grounded on experiments made by order of the marquis de Louvois. Let a coloured cloth of about forty-five ells, be laid in the uſual manner in the trough of a fulling-mill, without firſt ſoaking it in water, as commonly practiſed in moſt places. To full this trough-full of cloth fifteen pounds of ſope are required, one half of which is to be melted into two pails of river or ſpring water, made as hot as the hand can bear. Let this ſolution be poured by little and little, upon the cloth, in proportion as it is laid in the trough: thus it is to be fulled for at leaſt two hours; after which, let it be taken out and ſtretched. This done, let the cloth be immediately returned into the ſame trough, without freſh ſope, and there fulled two hours more: then take it out, wring it well, and expreſs all the greaſe and filth. After the ſecond fulling, diſſolve the remainder of the ſope, as the former part, and throw it at four ſeveral times on the cloth, not forgetting to take it out every two hours, to undo the plaits and wrinkles it got in the trough. When it is ſufficiently fulled, and brought to a requiſite quality and thickneſs, it is ſcoured out for good in hot water, keeping it in the trough till it be thoroughly clean. As white cloths full more eaſily than coloured ones, a third part of the ſope may be ſaved.

FULMINATING, ſomething that thunders, or reſembles thunder. See the articles Thunder.

FULMINATION, in chemiſtry, is uſed in a ſynonymous ſenſe with detonation. See Detonation.

FUMIGATION, in chemiſtry, a kind of calcination, when metals, or other hard bodies, are corroded, or ſoftened, by receiving certain fumes for that purpoſe.

Fumigation, in medicine, the application of fumes to particular parts of the body; as thoſe of factitious cinnabar to venereal ulcers.

FUMARIA, *Fumitory*, in botany, a genus of plants producing oblong tubulated ringent flowers, including two equally broad filaments terminated with three antheræ to each. The fruit is a ſhort unilocular pod, containing a number of roundiſh ſeeds.

The common fumitory is a low annual plant, with bluiſh green leaves finely divided; the flowers are produced on the tops of the ſtalks in May and June; the leaves are intenſely bitter, and are ſaid to open obſtructions, to ſtrengthen the ſtomach and viſcera, and to promote urine; it is alſo reckoned good againſt melancholy hypochondraic diſorders, the jaundice, and ſcurvy; and Hoffman gives it the preference to all other herbs as a purifier of the blood.

FUNCTION, the act of fulfilling the duties of any employment.

Function is alſo applied to the actions of the body.

Function, in algebra, denotes any compound quantity; and when one of the component quantities is variable, it is ſaid to be a variable function. See the article Quantity.

FUND, in anatomy, ſignifies the bottom of any cavity in the body, thus, the fund of the eye is that part poſſeſſed by the choroides and retina; the fund of the uterus, the fund of the bladder, &c. ſignify alſo the bottom of theſe parts. See the articles Eye and Uterus.

Fund, in commerce, ſignifies the ſtocks of the great trading and monied companies. See the article Stocks.

Funds is alſo a term adopted by thoſe who ſpeak of the public revenue of nations, to ſignify the ſeveral taxes that have been laid upon merchandizes either by way of duties of cuſtom, or exciſe, or in any other manner, to ſupply the exigencies of the ſtate, and to pay intereſt for what ſums it may have occaſion to borrow.

FUNERAL Rites, ceremonies accompanying the interment or burial of any perſon. See the article Burial.

Funeral Column, a column crowned with an urn, wherein the aſhes of ſome deceaſed perſon are ſuppoſed to be incloſed; the fuſt or ſhaft being beſet with tears or flames, the ſymbols of grief and immortality. See Column.

FUNGUS, in ſurgery, a ſoft, fleſhy, ſpongy excreſcence, ariſing in the membranes, tendons, and other nervous parts, in conſequence of ulcers, wounds, contuſions, &c.

To the order of fungi belong ſeveral genera; as, agaric, phallus, cycoperdon, &c. See AGARIC.

FUNNEL *of a Chimney*, the ſhaft or ſmalleſt part of the waſte, where it is gathered into its leaſt dimenſions.

Palladio directs, that the funnels of chimnies be carried through the roof four or five feet at leaſt, that they may carry the ſmoke clear from the houſe into the air. See CHIMNEY.

He alſo adviſes, that chamber-chimneys be not made narrower than ten or eleven inches, nor broader than fifteen; for if too narrow, the ſmoke will not be able to make its way; and if too wide, the wind will drive it back into the room.

FUNNEL-FASHIONED, or FUNNEL-SHAPED FLOWERS, in botany. See the article INFUNDIBULIFORM.

FUR, or FURR, in commerce. See FURR.

FURBISHER, a perſon who ſurbiſhes, poliſhes, or cleans arms, as guns, ſwords, piſtols, &c. which is chiefly performed with emery.

FURIES, *Eumenides*, *Diræ*, certain goddeſſes, whoſe office it was to puniſh the guilty after death. Theſe were three in number, Alecto, Megæra, and Tiſiphone, who were deſcribed with ſnakes inſtead of hair, and eyes like lightning, carrying iron chains and whips in one hand, and in the other flaming torches; the latter to diſcover, and the former to puniſh the guilty; and they were ſuppoſed to be conſtantly hovering over ſuch perſons as had been guilty of any enormous crime.

Mythologiſts ſuppoſe, that Tiſiphone puniſhed the crimes which ſprang from hatred or anger; Megæra, thoſe from envy; and Alecto, thoſe from an inſatiable purſuit after riches and pleaſure. They were worſhipped at Caſina in Arcadia, and at Carmia in Peloponneſus. They had a temple at Athens, near the Areopagus, and their prieſts were choſen from amongſt the judges of that court. At Telphuſia, a city in Arcadia, a black ewe was ſacrificed to them.

FURLING, in the ſea language, rolling a ſail up cloſe to the yard, ſtay, or maſt, and faſtening it by rolling a bandage or rope cloſe about it; and hence,

FURLING-LINE is a line to faſten the ſail; thoſe which are made for yards are plaited and flat, and called gaſketts.

FURLONG, a long meaſure, equal to $\frac{1}{8}$ of a miles, or forty poles. See the articles MEASURE, MILE, and POLE.

It is alſo uſed in ſome law-books for the eighth part of an acre. See ACRE.

FURLOUGH, in the military language, a licence granted by an officer to a ſoldier, to be abſent for ſome time from his duty.

FURNACE, a veſſel or utenſil for maintaining a ſtrong fire, either of coal or wood.

FURNACE is alſo applied to that uſed in the melting of iron, which authors frequently confound with iron forges, though there is a conſiderable difference between them. See FORGE.

FURNITURE, in dialling, certain additional points and lines, ſuch as the ecliptic, circles of declination, azimuths, Italian hours, points of the compaſs, &c. drawn on dial-planes.

FUROR UTERINUS, a ſpecies of madneſs peculiar to women, proceeding from an ardent and inordinate deſire of coition, which deprives the patient of the uſe of reaſon, ſo that ſhe ſpeaks all manner of obſcene words, and, abandoning all ſhame, invites the men to venereal embraces.

The immoderate deſire of copulation is produced by the plenty, acrimony, and heat of the uterine juices, exceeding the natural bounds, and creating an extraordinary turgency in the ſeminal veſſels, which, ſtimulating in a manner and inflaming the genital parts, excites a vehement and unruly appetite to venereal commerce.

FURR, in commerce, ſignifies the ſkin of ſeveral wild beaſts, dreſſed in alum with the hair on, and uſed as a part of dreſs by princes, magiſtrates, and others. The kinds moſt in uſe are thoſe of the ermine, ſable, caſtor, hare, rabbit, &c See the articles ERMINE, SABLE, &c.

FURRS, in heraldry, a bearing which repreſents the ſkins of certain beaſts, uſed as well in the doublings of the mantles belonging to the coat-armour, as in the coat-armours themſelves. See ERMINE.

FURR, among carpenters, a piece nailed upon a rafter, to ſtrengthen it when decayed, or to make it ſtraight when it has ſunk in the middle.

FURRING, among carpenters, is the regular faſhioning out any part. When the main piece of the material is ſcanty, either by defects, wains, or want of thickneſs; then a piece of the ſame is put behind it to make good its thickneſs, which is called a furr.

FURUNCLE, or BOIL, in ſurgery, a ſmall reſiſting tumour, with inflammation, redneſs, and great pain, ariſing in the adipoſe membrane, under the ſkin.

As there is no part of the body free from being the ſubject of furuncles, ſo the whole is ſometimes ſo miſerably infeſted with them, that the patient can hardly tell how to ſtir himſelf, or on what part to lie. Not only adults, but alſo the younger, even new-born infants, are obnoxious to this dreadful diſorder, which occaſions in them moſt fatiguing clamour and reſtleſſneſs. Though there is little danger in this diſeaſe in adults, yet, in tender infants, it occaſions convulſions, and even death itſelf.

The principal cauſe of furuncles is a too glutinous and inſpiſſated ſtate of the blood; and, conſequently, the greater the inſpiſſation, the worſe and more numerous will be the furuncles.

With regard to the cure, it ſeems to conſiſt chiefly in reſtoring the ſtagnated blood to its former circulation and free motion.

When the furuncles are very numerous, or return again; it is proper to uſe internal purging medicines, and ſuch as attenuate and cleanſe the blood. In adults, bleeding is proper, both by the lancet and ſcarification with cupping; and, at the ſame time, a ſtrict regimen of diet ſhould be uſed, drinking frequently and plentifully of a decoction of the woods, and ſuch like atenuators of the blood. The patient ſhould alſo entirely abſtain from drinking fermented and ſpirituous liquors, particularly wine and its ſpirit; and from the too frequent uſe of tobacco. When the diſorder is recent, external medicines only will frequently ſuffice for the whole cure. For this purpoſe, a mixture of honey, acidulated with ſpirit of vitriol till it has acquired a conſiderable ſharpneſs, is proper to anoint the furuncles. Of no leſs virtue is the frequent touching them with mere ſpirit of vitriol or ſulphur. Diſcutient plaſters are alſo found very ſerviceable, as thoſe of ſimple diachylon, de melito, de ſpermaceti, vel diaſaponis.

But if theſe medicines prove inſufficient to diſperſe the tumour, it is to be brought to ſuppuration, by applying a plaſter made of honey and flour, or of diachylon with the gums; and where theſe are inſufficient, to make uſe of the maturating cataplaſms recommended under the article PHLEGMON.

When the furuncle is known to be ripe, by its ſoftneſs and yellow head, recourſe is to be directly had to the ſcalpel; and having made an opening, the corrupted matter contained therein is to be diſcharged: after this, a plaſter of diachylon muſt be applied, and the ulcer daily cleanſed of its matter, till it is healed.

Puſtules and pimples ariſing in the face, are to be treated like furuncles; and, in both caſes, the drinking of whey, and the mineral waters, is accounted good for cleanſing the blood.

When ſucking infants are afflicted with furuncles, it is proper to give the mother, or nurſe, ſome purging medicine, and to order a ſtrict regimen and diet. At the ſame time, the infant ſhould take ſome gentle laxative medicine, with abſorbent powders, to allay the acrimony of its juices. *Heiſter.*

FURZE, or FURZE-BUSH, in botany. See the article ULEX.

FUSAROLE, in architecture, a round member, carved in the manner of a collar or chaplet, with oval beads, and placed immediately under the echinus, in the Doric, Ionic, and Compoſite capitals.

FUSEE, in clock work, is that conical part drawn by the ſpring, and about which the chain or ſtring is wound; for the uſe of which, ſee the articles CLOCK and WATCH.

FUSEE, or FIRELOCK. See MUSKETT.

FUSIBILITY, in natural philoſophy, that quality of bodies which renders them fuſible.

FUSIL, in heraldry, a bearing of a rhomboidal figure, longer than the lozenge, and having its upper and lower angles more acute and ſharp than the other two in the middle.

It is called in Latin, *fuſus*, a ſpindle, from its ſhape.

FUSILIERS, or FUSILEERS, in the military art, are foot ſoldiers, armed with fuſees, or firelocks. See the article FIRELOCK.

FUSILY, or FUSILE, in heraldry, ſignifies a field, or ordinary, entirely covered over with, or divided into, fuſils. See FUSIL.

FUSION, the melting of metals, minerals, &c. by means of fire.

Different metals run in different manners from their ores: thus, lead, though extremely fuſible in the metal, runs with difficulty from the ore, ſo as to require a conſiderable violence of fire. This ſtubbornneſs not belonging to the metal, muſt be attributed to the ſtony, ſulphureous, or other mineral matter with which the ore is mixed; which matter ſeems to require a degree of heat capable of vitrifying the lead, before the metal will run: but then the lead thus vitrified, recovers a metallic form again, by coming in contact with the coals. See the article LEAD.

Tin runs from its ore with greater eaſe than lead, and is therefore melted in much leſs furnaces: but copper requires an intenſe heat, or a blaſt furnace; and iron the greateſt heat that can be given in a furnace: and both iron and copper abſolutely require immediate contact with the fuel employed. Hence it appears, that each metal muſt have its determinate degree of heat, to run it with advantage from the ore or ſtone.

In order, likewiſe, to obtain the metal from the ore to the beſt advantage, the ſcoria or ſlag muſt be neceſſarily made to run thin and fluid; otherwiſe it entangles or inviſcates the metal, and will not let it ſeparate fully. And hence we may frequently obſerve, in the aſſaying of copper ores, ſmall grains of metal interſperſed here and there, among the ſcoria, that require to be ſeparated by ſtamping and waſhing the whole maſs; which labour might have been prevented, by uſing a proper degree of heat capable of procuring a thin fuſion and a ſuitable flux, ſo as to have made all the metals fall to the bottom of the crucible; which it conſtantly does, when the operation is well performed. See FLUX.

It ſeems principally owing to a defect in the knowledge of fuſion, that ſo many recrements or ſlags of metals, anciently thrown as uſeleſs from the furnace, have been of late wrought to conſiderable profit by more ſkilful workmen: at leaſt, it ſeems more rational to attribute the ſucceſs to this cauſe, than to a ſuppoſed growth of metals in ſuch ſlags; or to believe that lead has grown rich in ſilver by lying expoſed to the open air, while, perhaps, it is rather owing to the unſkilfulneſs of the former workmen, who were unable to ſeparate all the ſilver contained in the lead.

All moiſture, and too ſudden cooling, prove prejudicial to the more ignoble metals after fuſion, and ſometimes dangerous to the operator: for a litle water falling upon melted iron or copper, makes them expand with prodigious violence, and diſcharge themſelves abroad with a force like that of a cannon; and even ſudden cooling will often occaſion the ſurface of the metal to crack, and ſuffer the more internal part, not yet ſet or fixed, to iſſue out to a conſiderable diſtance; whence either the loſs of the metal or miſchief may enſue.

To prevent theſe ill effects, after copellation it is uſual for the operator to throw a quantity of water, all at once, upon the lump of ſilver, as it lies in the teſt, at the moment when it begins to grow rigid; for the water, by its coldneſs, ſuddenly makes ſo thick a cover upon the ſurface of the ſilver, that the hotter parts in the inſide connot break through the upper. *Shaw's Chem. Lect.*

FUST, the ſame with the ſhaft of a column. See the articles COLUMN and SHAFT.

FUSTIAN, in commerce, a kind of cotton ſtuff, which ſeems as it were whaled on one ſide.

Right fuſtians ſhould be altogether made of cotton-yarn, both woof and warp; but a great many are made, of which the warp is flax, or even hemp.

There are fuſtians made of ſeveral kinds, wide, narrow, fine, coarſe; with ſhag, or nap, and without it.

FUSTIC, the wood of a ſpecies of mulberry, which grows naturally in the Weſt-Indian iſlands and Campeachy. With us it it much uſed for dyeing yellow.

FUTTOCKS, in ſhip-building, that part of a timber which reaches from the floor to the top-timber. See this diſtinctly explained in the article TIMBER.

FUTTOCK-*Shrowds.* See the article *Futtock*-SHROWDS.

FUTURE, in general, denotes whatever regards futurity, or the time to come. See article TIME.

FUTURE TENSE, among grammarians. See the article TENSE.

FUZEE, or FUSEE, in military affairs. See the article FUSEE.

FUZEE, among farriers, two dangerous ſplents, joining from above downwards. They differ from ſcrews or thorough ſplents in this, that the latter are placed on two oppoſite ſides of the leg. See the article SPLENT.

G.

G, in grammar, the ſeventh letter and fifth conſonant of our alphabet; but in the Greek, and the oriental languages, it occupies the third place. It is one of the mutes, and cannot be ſounded without the aſſiſtance of ſome vowel.

In Engliſh it has a hard and ſoft ſound; hard, as in the words *game*, *gun*, &c. and ſoft, as in the words *geſture*, *giant*, &c. at the end of words, *gh* is pronounced like *ff*, as in the words *rough*, *tough*, &c. The letter *g* is alſo uſed in many words where the ſound is not perceived, as in *ſign*, *reign*, &c.

As a numeral, G was anciently uſed to denote 400; and with a daſh over it, thus $\bar{G}$, 40,000. In muſic it is the character or mark of the treble cleff; and from its being placed at the head, or marking the firſt ſound in Guido's ſcale, the whole ſcale took the name gamut. See the articles CLEF and GAMUT.

GABEL, a word met with in old records, ſignifying a tax, rent, cuſtom, or ſervice, paid to the king, or other lord.

GABEL, according to the French duties or cuſtoms, a tax upon ſalt, which makes the ſecond article in the king's revenue, and amounts to about one fourth part of the whole revenue of the kingdom.

GABIONS, in fortification, baſkets made of ozier-twigs, of a cylindrical form, ſix feet high, and four wide; which being filled with earth, ſerve as a ſhelter from the enemies fire.

They are commonly uſed on batteries, to ſcreen the engineers, &c. in order to which, one is placed on either ſide of each gun, room being only left for the muzzle to appear through. They alſo ſerve as a parapet on lines, lodgments, &c. when the ground is too hard to dig into.

There are a ſmaller ſort, uſed on parapets in trenches, &c. to cover the muſqueteers; which are placed ſo cloſe that the muzzle of a muſquet can hardly be put through.

GABLE, or GAVEL, among builders. See GAVEL.

GAD, among miners, a ſmall punch of iron, with a long wooden handle, uſed to break up the ore.

One of the miners holds this in his hand, directing the point to a proper place, while the other drives it into the vein, by ſtriking it with a ſledge hammer.

GAD-FLY, or BREEZE-FLY, names given to the black and yellow bodied œſtrus, a fly nearly as large as the common blue fleſh-fly. See OESTRUS.

GAFOLD-LAND, in old law-books, land liable to taxes, and let for rent.

GAGATES, JET, in natural hiſtory. See the article JET.

GAGE, in law-books, the ſame with ſurety or pledge. See the articles SURETY and PLEDGE.

GAGE, in joinery, an inſtrument in which a piece of wood is moveable upon a ſtaff, ſo as to be ſet nearer or farther at pleaſure. Its uſe is to draw a line parallel to the ſtraight ſide of any board, for gaging tenons, and marking ſtuff for an equal thickneſs.

GAGE, among letter-founders, a piece of box, or rather hard wood, variouſly notched; the uſe of which is to adjuſt the dimenſions, ſlopes, &c. of the different ſorts of letters. See *Letter* FOUNDERY.

Sliding-GAGE, a tool uſed by mathematical inſtrument makers, for meaſuring and ſetting off diſtances.

GAGE, or *Weather*-GAGE, in navigation, a ſhip is ſaid to have gained the weather-gage of another when ſhe makes a greater progreſs to the windward, or when ſhe ſails to the windward of ſome other. See the article TACKING.

Sea-GAGE, an inſtrument invented by Dr. Hales and Dr. Deſaguliers, for finding the depth of the ſea.

Bucket-Sea-GAGE, an inſtrument contrived by Dr. Hales, to find the different degrees of coldneſs and ſaltneſs of the ſea, at different depths; conſiſting of a common houſhold pail or bucket, with two heads to it. Theſe heads have each a round hole in the middle, near four inches diameter, and covered with valves opening upwards; and that they might both open and ſhut together, there is a ſmall iron rod fixed to the upper part of the lower valve, and at the other end to the under part of the upper valve; ſo that as the bucket deſcends with its ſinking weight into the ſea, both the valves open by the force of the water, which by that means has a free paſſage through the bucket. But when the bucket is drawn up, then both the valves ſhut by the force of the water at the upper part of the bucket; ſo that the bucket is brought up full of the loweſt ſea-water to which it had deſcended.

When the bucket is drawn up, the mercurial thermometer, fixed in it, is examined; but great care muſt be taken to obſerve the degree at which the mercury ſtands, before the lower part of the thermometer is taken out of the water in the bucket, elſe it would be altered by the different temperature of the air.

In order to keep the bucket in right poſition, there are four cords fixed to it, reaching about four feet below it, to which the ſinking weight is fixed.

Water-GAGE, HYDROMETER. See the article HYDROMETER.

GAIANITES, *Gaianitæ*, in church hiſtory, a branch of Eutychians. See EUTYCHIANS.

GAIN, in commerce, is uſed in a ſynonymous ſenſe with profit. See PROFIT.

GALIN, in architecture, the levelling ſhoulder of a joiſt or other timber.

It is alſo uſed for the lapping of the end of the joints, &c. upon a trimmer or girder, and then the thickneſs of the ſhoulder is cut into the trimmer, alſo levelling upwards, that it may juſt receive the gain, and ſo the joiſt and trimmer lie even and level with the ſurface.

This way of working is uſed in floors and hearths.

GALANGALS, *Galanga*, in the materia medica, the name of two roots kept in the ſhops, a greater and a ſmaller; of which the ſmaller is by far the moſt eſteemed.

The leſſer galangal is a ſmall and ſhort root, of an irregular figure, and of the thickneſs of a man's little finger, ſeldom met with more than an inch or two long. It ſhould be choſen full and plump, of a bright colour, very firm and ſound, and of an acrid and inſupportably hot taſte.

The larger galangal is brought to us in pieces of two inches or a little more in length, and of near an inch in thickneſs: its ſurface is leſs unequal and tuberoſe than the ſmaller ſort, but is far from being ſmooth; on the outſide it is of a brown colour, with a very faint caſt of red, and within it is of a paler colour, and has a much leſs acrid and pungent taſte than the ſmaller kind. It is to be choſen in the largeſt, ſoundeſt, and heavieſt pieces.

The roots of both the galangals, but particularly of the leſſer, abound with a volatile, oily, aromatic ſalt; the leſſer is eſteemed an excellent ſtomachic: it has the credit of being a great cephalic, cardiac, and uterine, but is more particularly recommended in vertigos. The greater galangal poſſeſſes the ſame virtues, but in a leſs degree

GALANTHUS, the ſnow-drop, in botany, a bulbous rooted plant, whoſe flower conſiſts of three oblong concave petals, which ſpread open and are equal; the nectarium is obtuſe, cylindrical, and indented; the ſtamina are ſix ſhort filaments, topped with oblong acuminated antheræ inclining together; and the fruit is an oval capſule obtuſely trigonal, with three cells, which are filled with a number of roundiſh ſeeds. The ſnow-drop being one of the firſt flowers which blow in the ſpring, it therefore well deſerves a place in gardens, particularly a variety with a double nectarium.

GALAXY, in aſtronomy, the via lactea, or milky way in the heavens: a tract of a whitiſh colour, and conſiderable breadth, which runs through a great compaſs of the heavens, ſometimes in a double, but for the greateſt part of its courſe in a ſingle ſtream; and is compoſed of a vaſt number of ſtars, too minute or too remote from the earth to be diſtinguiſhed by the naked eye; but are diſcovered in all parts of it, in great numbers, by the aſſiſtance of the teleſcope.

GALBANUM, in pharmacy, a gum iſſuing from the ſtem of an umbelliferous plant, growing in Perſia and many parts of Africa.

It is ſometimes met with in the ſhops in looſe granules, called drops or tears, and ſometimes in large maſſes, formed of a number of theſe blended together; but in theſe maſſes ſome accidental foulneſs is often mixed with the gum. The ſingle drops uſually approach to a roundiſh, oblong, pear-like form. Galbanum is ſoft like wax, and, when freſh drawn, white; but it afterwards becomes yellowiſh or reddiſh: it is of a ſtrong ſmell, of an acrid and bitteriſh taſte; it is inflammable in the manner of a reſin, and ſoluble in water like a gum.

It attenuates and diſſolves tough phlegm, and is therefore of ſervice in aſthmas and inveterate coughs; it is alſo of great ſervice in hyſteric complaints; it diſſipates flatulencies, promotes the menſes, and facilitates delivery and the expulſion of the ſecundines. It is given in pills and electuaries, and is uſed externally in form of a plaſter, applied to the belly, againſt habitual hyſteric complaints, and on many other occaſions.

GALENIC, GALENICAL, in pharmacy, a manner of treating diſeaſes founded on the principles of Galen.

The diſtinction of galenical and chemical was occaſioned by a diviſion of the practitioners of medicine into two ſects, which happened on the introduction of chemiſtry into medicine; then the chemiſts arrogating to themſelves every kind of merit and ability, ſtirred up an oppoſition to their pretentions, founded on the invariable adherence of the other party to the ancient practice. And though this diviſion into the two ſects of galeniſts and chemiſts has long ceaſed, yet the diſtinction of medicines, which reſulted from it, is ſtill retained.

Galenical medicines are thoſe which are formed by the eaſier preparations of herbs, roots, &c. by infuſion, decoction, &c. and by combining and multiplying ingredients; while thoſe of chemiſtry draw their more intimate and remote virtues by means of fire and elaborate preparations, as calcination, digeſtion, fermentation, &c.

GALENISTS, in church hiſtory, a branch of anabaptiſts, who are ſaid to have adopted ſeveral Arian opinions concerning the divinity of our Saviour.

GALILEANS, a ſect of Jews. Their founder was one Judas, a native of Galilee, from which place they derived their name. Their chief, eſteeming an indignity for the Jews to pay tribute to ſtrangers, raiſed up his countrymen againſt the edict of the emperor Auguſtus, which had ordered a taxation or enrollment of all the ſubjects of the Roman empire,

They pretended that God alone ſhould be owned as maſter and lord; and in other reſpects were of the opinion of the Phariſees: but as they judged it unlawful to pray for infidel princes, they ſeparated themſelves from the firſt of the Jews, and performed their ſacrifices apart.

GALL, in the animal œconomy, the ſame with bile. See BILE and BILIOUS.

GALL-BLADDER, called veſicula, and cyſtis fel lea, is uſually of the ſhape of a pear, and of the ſize of a ſmall hen's egg. It is ſituated in the concave ſide of the liver, and lies upon the colon, part of which it tinges with its own colour. It is compoſed of four membranes, or coats; the common coat, a veſicular one, a muſcular one (conſiſting of ſtraight, oblique, and tranſverſe fibres) and a nervous one, of a wrinkled or reticulated ſurface within, and furniſhed with an unctious liquor.

The uſe of the gall bladder is to collect the bile, firſt ſecreted in the liver, and mixing it with its own peculiar produce, to perfect it farther, to retain it together a certain time, and then to expel it.

GALL, in natural hiſtory, denotes any protuberance or tumour produced by the puncture of inſects on plants and trees of different kinds.

Theſe galls are of various forms and ſizes, and no leſs different with regard to their internal ſtructure. Some have only one cavity, and others a number of ſmall cells communicating with each other. Some of them are as hard as the wood of the tree they grow on, whilſt others are ſoft and ſpongy; the firſt being called gall-nuts, and the latter berry-galls, or apple-galls.

The general hiſtory of galls is this: an inſect of the fly-kind is inſtructed by nature to take for the ſafety of her young, by lodging her eggs in a woody ſubſtance, where they will be defended from all injuries: ſhe, for this purpoſe, wounds the branches of a tree, and the lacerated veſſels, diſcharging their contents, ſoon form tumours about the holes thus made. The hole in each of theſe tumours, through which the fly has made its way, may for the moſt part be found; and when it is not, the maggot-inhabitant or its remains are ſure to be found within, on breaking the gall. However, it is to be obſerved, that in thoſe galls which contain ſeveral cells, there may be inſects found in ſome of them, though there be a hole by which the inhabitant of another cell has eſcaped.

Oak-galls put, in a very ſmall quantity, into a ſolution of vitriol in water, though but a very weak one, give it a purple or violet colour; which, as it grows ſtronger, becomes black; and on this property depends the art of making our writing-ink, as alſo a great deal of thoſe of dyeing and dreſſing leather, and other manufactures.

In medicine, galls are found to be very aſtringent, and good, under proper management, in diarhœas, dyſenteries, and hæmorrhages of all kinds; they have alſo a very eminent virtue as a febrifuge. Half a dram, or more, of the powder of Aleppo galls, may be given for a doſe, and will often cure an intermittent fever. They are alſo uſed externally by way of fomentation in procidentiæ of the anus: and a decoction of them has been injected in the fluor albus with great ſucceſs.

GALLEASSES, in the marine, the largeſt ſort of armed veſſels next to ſhips of war: they are a ſort of ſhip of one deck and three maſts; and are uſed by the Venetians only: they have thirty-two banks of oars, with ſix or ſeven ſlaves to an oar; three batteries of guns from thirty-ſix to twenty four pounders; their complement of men conſiſts of a thouſand or twelve hundred. To ſee one of theſe galleaſſes at ſea, ſhe appears like a great floating iſland, able in appearance to encounter with twenty galleons (ſee the next article.) The Turks have ſhips not unlike them, which they call mahones.

GALLEON was formerly a name given to ſhips of war which had three or four decks. The name is now no longer in uſe but with the Spaniards, which they give to their ſhips which are deſtined for Weſt-India voyages. Theſe ſhips, which are a larger ſize, have always four decks. They give alſo the ſame name to greater or ſmaller veſſels, which go yearly to La Vera Cruz. The Portugueſe have ſhips which they call caragues, ſomewhat reſembling the galleon, which they ſend to India and the Brazils.

GALLERY *of a Ship*, a ſort of raiſed balcony, without the cabin, at the ſtern or quarter of a ſhip, for the convenience of the commander.

Gallery, in architecture, a covered place in a houſe, much longer than broad, and uſually in the wings of a building, its uſe being chiefly to walk in.

Gallery, in fortification, a covered walk acroſs the ditch of a town, made of ſtrong beams covered over head with planks, and loaded with earth: ſometimes it is covered with raw hides, to defend it from the artificial fires of the beſieged. Its ſides ſhould be muſket proof. It ought to be eight feet high, and ten or twelve wide, and the covering to riſe with a ridge, that what is thrown upon it by the beſiegers with a deſign to burn it, may roll off.

Galleries are chiefly uſed to ſecure and facilitate the miners approach to the face of the baſtion, over the moat, which is already ſuppoſed to be filled up with faggots and bavins, and the artillery of the oppoſite flank diſmounted.

Gallery, *of a Mine*, is a narrow paſſage, or branch of a mine, carried on underground to a work deſigned to be blown up.

Both the beſiegers and the beſieged alſo, carry on galleries in ſearch of each other's mines, and theſe ſometimes meet and deſtroy each other.

Gallery, in gardening, a kind of covered walk in a garden, formed into porticoes or arches, with trees of different ſorts; but in the preſent practice is much in diſuſe.

GALLEY, a kind of low flat-built veſſel, with one deck, made either to ſail or row: they are from an hundred and twenty, to an hundred and thirty feet long, eighteen feet broad, and nine or ten feet deep. They have two maſts which can be ſtruck at pleaſure, two lateen ſails, and five pieces of cannon. The galleys have commonly twenty five or thirty banks of oars on either ſide, to each of which are chained five or ſix ſlaves. There are no gallies now but in the Mediterranean: they are commonly kept cloſe along ſhore, though they ſometimes venture out to ſea for a ſhort cruize.

GALLIAMBIC Verse, *Galliambus*, in ancient poetry, a verſe conſiſting of ſix feet, viz. an anapeſt, or a ſpondee; an iambus, or an anapeſt, or a tribrach; an iambus; a dactyl; a dactyl; an anapeſt.

The word galliambus is a compound of iambus and gallus, a prieſt of Cybele. Theſe prieſts carried about the image of that goddeſs, in order to get alms, and as a part of their employment was ſinging verſes all over the country, they, by this means, rendered poetry very deſpicable.

GALLI, in antiquity, the prieſts of the goddeſs Cybele, who were eunuchs, and took their name on Gallus, a river in Phrygia.

GALLICAN, any thing belonging to France: thus the term Gallican-church, denotes the church of France, or the aſſembly of the clergy of that kingdom. See Church.

GALLINÆ, in ornithology, an order of birds, the beak of which is conic, and ſomewhat incurvated, and the upper chap imbricated.

Under this order are comprehended the oſtrich, peacock, pheaſant, woodcock, turkey, the common dunghill-cock, partridge, &c.

GALLINACEOUS, an appellation given to birds of the order of the gallinæ.

GALLING, or Excoriation, in medicine. See Excoriation.

Galling *of a Horſe's Back*, a diſorder occaſioned by heat, and the chafing or pinching of the ſaddle.

In order to prevent it, ſome take a hind's ſkin well garniſhed with hair, and fit it nearly under the pannel of the ſaddle ſo that the hairy ſide may be next the horſe.

When a horſe's back is galled upon a journey, take out a little of the ſtuffing of the pannel over the ſwelling, and ſew a piece of ſoft white leather on the inſide of the pannel; anoint the part with ſalt butter, and every evening wipe it clean, rubbing it till it grows ſoft, anointing it again with butter, or for want of that, with greaſe: waſh the ſwelling, or hurt, every evening with cold water and ſoap, and ſtrew it with ſalt, which ſhould be left on till the horſe be ſaddled in the morning.

GALLIUM, ladies-bedſtraw, in botany, a genus of plants, the flower of which is a quadrifid ſingle petal, without any tube, and placed flatwiſe: the fruit conſiſts of two globoſe bodies, growing cloſe together, but not adhering, and containing each a ſingle kidney-ſhaped ſeed. It is ſaid to be an exellent aſtringent.

GALLON, a meaſure of capacity both for dry and liquid things, containing four quarts; but theſe quarts, and conſequently the gallon itſelf, are different, according to the quality of the thing meaſured: for inſtance, the wine gallon contains 231 cubic inches, and holds eight pounds averdupois of pure water: the beer and ale gallon contains 282 ſolid inches, and holds ten pounds three ounces and a quarter averdupois of water; and the gallon for corn, meal, &c. 272¼ cubic inches and holds nine pounds thirteen ounces of pure water.

GALLOON, in commerce, a narrow thick kind of ferret, or lace, uſed to egde or border cloaths, ſometimes made of wool, and at others of gold or ſilver.

GALLOP, in the manege, a motion of a horſe that runs at full ſpeed; in which, making a kind of leap forwards, he lifts both his fore-legs almoſt at the ſame time; when theſe are in the air, juſt upon the point of touching the ground, he lifts both his hind-legs almoſt at once.

GALLOWS *of a Plough*, a part of the plough head, ſo called by farmers, from its reſemblance to the common gallows, as conſiſting of three pieces of timber, whereof one is placed tranſverſely over the heads of the other two. See PLOUGH.

GALLUS, the COCK, in ornithology, a well known domeſtic fowl, the head of which is ornamented with a longitudinal fleſhy creſt, or comb: the wattles are two, and placed longitudinally on the throat. This, in its natural ſtate, is a very robuſt and beautiful bird, variegated with a great number of elegant colours.

GALLY, in printing, a frame into which the compoſitor empties the lines out of his compoſing-ſtick, and in which he ties up the page when it is completed.

The gally is formed of an oblong ſquare board, with a ledge on three ſides, and a groove to admit a falſe bottom, called a gally-ſlice.

GAMBOGE, is a concreted vegetable juice, the produce of two trees both called by the Indians caracapulli, and is partly of a gummy, and partly of a reſinous nature. It is brought to us either in form of orbicular maſſes, or of cylindrical rolls of various ſizes; and is of a denſe, compact, and firm texture, and of a beautiful yellow. It is chiefly brought to us from Cambaja, in the Eaſt-Indies, called alſo Cambodja, and Cambogio; and from thence it has obtained its names of cambadium, cambogium, and gambogium.

It is a very rough and ſtrong purge; it operates both by vomit and ſtool, and both ways with much violence, almoſt in the inſtant in which it is ſwallowed; but yet without griping. It requires caution and judgment in adminiſtring it; but thoſe who know how to give it properly, find it an excellent remedy in dropſies, cachexies, jaundice, aſthmas, catarrhs, and the worſt cutaneous eruptions.

Its doſe is from two or three grains, to ſix, eight, or ten: four grains generally operate briſkly without vomiting, and eight or ten grains uſually vomit briſkly, and afterwards purge downwards.

It is at preſent much more eſteemed by painters in water-colours, than by phyſicians.

GAME, *Ludus*, in general, ſignifies any diverſion, or ſport, that is performed with regularity, and reſtrained to certain rules. See the article GAMING.

GAMES, *Ludi*, in antiquity, were public diverſions, exhibited on ſolemn occaſions. Such, among the Greeks, were the Olympic, Pythian, Iſthmian, Nemæan, &c. games; and, among the Romans, the Apollinarian, Circenſian, Capitoline, &c. games. See the articles OLYMPIC, PYTHIAN, &c.

GAMELIA, γαμηλια, in Grecian antiquity, a nuptial feaſt, or rather ſacrifice, held in the ancient Greek families on the day before marriage; thus called, from a cuſtom they had of ſhaving themſelves on this occaſion, and preſenting their hair to ſome deity to whom they had particular obligations.

GAMELION, a poem or compoſition in verſe on the ſubject of a marriage, commonly called epithalamium. See EPITHALAMIUM.

GAMING, the art or act of performing or practiſing any game, particularly a game of hazard, and this generally for ſtakes or a ſum of money. See *Laws of* CHANCE.

GAMMUT, GAM, GAMMA, or GAMMAUT, in muſic, a ſcale whereon we learn to ſound the muſical notes, *ut*, *re*, *mi*, *fa*, *ſol*, *la*, in their ſeveral orders and diſpoſitions. See NOTE and SCALE.

The invention of this ſcale is owing to Guido Aretine; though it is ſo properly an invention as an improvement on the diagram, or ſcale of the Grecians. See the article DIAGRAM.

The gammut is alſo called the harmonical hand, by reaſon that Guido made firſt uſe of the figure of the hand to demonſtrate the progreſſion of his ſounds.

Guido, finding the diagram of the ancients of too ſmall an extent, added five more cords or notes to it; one below the proſlambanomenos of the ancients, and four above the hyperbolæon. The firſt he called hypoproſlambanomenos, and denoted it by the letter G, or the Greek Γ, gamma; which note being at the head of the ſcale, occaſioned the whole ſcale to be called by the name of gamm, or gammut. This ſcale is divided into three ſeries or columns, the firſt called durum, the ſecond natural, and the third molle, &c.

GAMMUT, or GAMM, is alſo the firſt or graveſt note in the modern ſcale of muſic, the reaſon of which is ſhewn under the preceding article.

GANDER, in ornithology, the male of the gooſe kind; one of which, it is ſaid, will ſerve five geeſe. See GOOSE.

GANGLIO, or GANGLION, in ſurgery, a hard tubercle, generally moveable, in the external or internal part of the carpus, upon the tendons or ligaments in that part, uſually without any pain to the patient. Though ganglions ſo nearly reſemble an encyſted tumour, that Celſus makes them one and the ſame; yet their differences may appear, if it were only from their different ſeats; ganglions being confined to the tendons and ligaments of the hands and feet, whereas encyſted tumours are not reſtrained to any part of the body. See the article ENCYSTED.

With regard to the cauſe of ganglions, they ſeem generally to proceed from an inſpiſſation of the viſcid juices, which are let out, and lodged betwixt the fibres and membranes, when the tendons and ligaments of thoſe parts have been injured by a fall, blow, ſtrain, contuſion, or the like, in which caſe they gradually increaſe more or leſs, as long as the fibres yield; the juices find vent ſo as to advance to the ſize of a filbert, walnut, or even a pigeon's egg: ſome are oblong, round, or oval, with an equal or uneven ſurface, ſome of them which are recenr, may be eaſily diſperſed; and others, which have been long ſtanding, hardly yield to any remedies but the knife.

The inſpiſſated matter of a recent ganglion may often be happily diſperſed by barely rubbing the tumour well every morning with the faſting ſaliva, and binding a plate of lead on it afterwards for ſeverel weeks ſucceſſively. Many attribute a greater diſcutient virtue to the lead, when it has firſt had ſome mercury rubbed on it. Foreſtus, and others, adviſe the uſe of a plaſter of ammoniac and mercury, and often to rub them with oil of ſoap. Others write, that a cure may be readily performed, if the patient lays his hand upon a table, and ſtrikes on the tumour with his fiſt: but care ſhould be taken not to injure the bones, tendons, or other parts of the hand, in ſtriking the tumour; and the ſame care muſt be taken if there is a neceſſity of having recourſe to cauſtics or inciſions, in order to remove them.

GANGRENE, a very great and dangerous degree of inflammation, wherein the parts affected begin to corrupt, and put on a ſtate of putrefaction. A gangrene is diſtinguiſhed from a ſphacelus, inaſmuch as this latter is not an incipient but an abſolute and perfect corruption, or death of the parts, already made. See the article Sphacelus.

A gangrene may be diſcovered generally from the following ſigns; namely, the inflammation, with its ſymptoms, which have all along been very violent, do generally undergo a ſudden change, as if they were going off. The parts which were before ſwelled and tenſe, do now grow ſoft and flaccid, and upon preſſing with the finger on the ſkin and fat, its impreſſion remains behind, as in an œdema; at length the cuticula ſeparates from the cutis, often riſing up in bliſters, like thoſe on burns filled with a reddiſh, yellowiſh, and black humour; and the ſenſe of the limb is in ſome degree diminiſhed. See the article Oedema.

A gangrene is for the generality never without danger, becauſe it eaſily changes into a ſphacelus, or intire mortification, which never admits of cure but by taking off the dead parts. But a gangrene which is ſlight, incipient, and not ſpread far, but only effects the ſkin and flat, is not very difficult to cure; eſpecially when it happens in a young and ſtout patient, in a mild and temperate ſeaſon, and does little or no injury to the muſcles and nerves: but the larger, more violent, and confirmed is the gangrene, and the faſter it ſpreads, the more difficult it is generally to effect a cure, eſpecially in an old or weak patient; or in an ill habit of body, from a dropſy, phthiſis, or ſcorbutus: the weather alſo being too hot, or very cold, or the parts affected being near the thorax, or abdomen, may make the caſe more dangerous. Nor can this caſe be neglected without the utmoſt danger of life, or its ſuddenly turning into a ſphacelus.

GANNET, in ornithology, a bird of the larus or gull kind, frequent on the weſtern coaſts of England.

It is equal in ſize to the common duck. The upper part of the body is of a deep ruſty ferrugineous colour, much like that of the common buzzard; and the breaſt and belly are alſo brown, but paler. It is an extremely ſingular ſpecies, its whole aſpect, in ſome degree, approaching to that of ſome of the larger birds of prey.

GANTLET, or Gauntlet, a large kind of glove, made of iron, and the fingers covered with ſmall plates. It was formerly worn by cavaliers, when armed at all points.

GAOL, a priſon, or place of legal confinement.

Gaol-Delivery, is where a commiſſion or patent is granted by the king in the nature of a letter, to certain perſons, who are thereby appointed his juſtices; or to two or three of them, authorizing them to deliver his gaol, at ſuch a place, of the priſoners contained therein; and for that end it commands them to meet at ſuch a place, at the time they themſelves ſhall appoint, when the ſheriff of the county is commanded to bring all the priſoners in the gaol before them, &c. 4 *Inſt.* 168.

GARBLER *of Spices*, an antient officer in the city of London, who is authorized to go into ſhops, ware-houſes, &c. there to view and ſearch drugs, ſpices, &c. and ſee that they were garbled or cleanſed from the droſs and duſt wherewith they are mixed.

GARDANT, or Guardant, in heraldry, denotes any beaſt full-faced, and looking right forward.

GARDEN, a plot of ground, cultivated and properly ornamented with a variety of plants, flowers, fruit, &c.

Gardens are uſually diſtinguiſhed into flower-garden, fruit-garden, and kitchen-garden, the firſt of which, being deſigned for pleaſure and ornament, is to be placed in the moſt conſpicuous part, that is, next to the back front of the houſe; and the two latter being deſigned for uſe, ſhould be placed leſs in ſight. But though the fruit and kitchen-gardens are here mentioned as two diſtinct gardens, yet they are now uſually in one; and that with good reaſon, ſince they both require to be placed out of the view of the houſe. See Kitchen Garden.

In the choice of a place proper for a garden, the moſt eſſential points to be conſidered are the ſituation, the ſoil, the expoſure, water, and proſpect.

1. As to the ſituation, it ought to be ſuch a one as is wholeſome, and in a place neither too high, nor too low; for if a garden be too high, it will be expoſed to the winds, which are very prejudicial to

trees; and if it be too low, the dampneſs, the vermin, and the venomous creatures that breed in ponds, and marſhy places, add much to their inſalubrity. The moſt happy ſituation is on the ſide of a hill, eſpecially if the ſlope be eaſy, and in a manner imperceptible; if a good deal of level ground be near the houſe; and if it abounds with ſprings of water; for, being ſheltered from the fury of the winds, and the violent heat of the ſun, a temperate air will be there enjoyed; and the water that deſcends from the top of the hill, either from ſprings or rain, will not only ſupply fountains, canals, and caſcades, for ornament, but when it has performed its office, will water the adjacent valleys, and, if it be not ſuffered to ſtagnate, will render them fertile and wholeſome. Indeed if the declivity of the hill be too ſteep, and the water be too abundant, a garden on the ſide of it may frequently ſuffer, by having the trees torn up by torrents and floods; and by the tumbling down of the earth above, the walls may be demoliſhed, and the walks ſpoiled. It cannot, however, be denied, that the ſituation on a plain, or flat, has ſeveral advantages which the higher ſituation has not: for floods and rain commit no damage; there is a continued proſpect of champaigns, interſected by rivers, ponds, and brooks, meadows and hills, covered with woods or buildings; beſides, the level ſurface is leſs tireſome to walk on, and leſs chargeable, than that on the ſide of a hill, ſince terrace-walks and ſteps are not there neceſſary; but the greateſt diſadvantages of flat gardens, is the want of thoſe extenſive proſpects which riſing grounds afford.

2. A good earth, or ſoil, is next to be conſidered; for it is ſcarce poſſible to make a fine garden in a bad ſoil; there are indeed ways to meliorate ground, but they are very expenſive; and ſometimes when the expence has been beſtowed of laying good earth three feet deep over the whole ſurface, a large garden has been ruined, when the roots of the trees have come to reach the natural bottom.

To judge of the quality of the ſoil, obſerve whether there be any peath, thiſtles, or ſuch like weeds, growing ſpontaneouſly in it; for they are certain ſigns that the ground is poor. Or if there be large trees growing thereabouts, obſerve whether they grow crooked, ill-ſhaped, and grubby; and whether they are of a faded green and full of moſs, or infeſted with vermin; if this be the caſe, the place is to be rejected: but on the contrary, if it be covered with good graſs fit for paſture, you may then be encouraged to try the depth of the ſoil. To know this, dig holes in ſeveral places, ſix feet wide, and four feet deep, and if you find three feet of good earth, it will do very well, but leſs than two will not be ſufficient. The quality of good ground is neither to be ſtony, nor too hard to work; neither too dry, too moiſt, nor too ſandy and light; nor too ſtrong and clayey, which is the worſt of all for gardens.

3. The next requiſite is water, the want of which is one of the greateſt inconveniences that can attend a garden, and will bring a certain mortality upon whatever is planted in it, eſpecially in the greater droughts that often happen in a hot and dry ſituation in ſummer; beſides its uſefulneſs in fine gardens for making fountains, canals, caſcades, which are the greateſt ornament of a garden.

4. The laſt thing to be conſidered is the proſpect of a fine country; and though this is not ſo abſolutely neceſſary as water, yet it is one of the moſt agreeable beauties of a fine garden: beſides, if a garden be planted in a low place that has no kind of proſpect, it will not only be diſagreeable, but unwholeſome.

In the laying out and planting of gardens, the beauties of nature ſhould always be ſtudied, for the nearer a garden approaches to nature, the longer it will pleaſe. The area of a handſome garden may take up thirty or forty acres, but not more, and the following rules ſhould be obſerved in the diſpoſition of it:— There ought always to be a deſcent at leaſt three ſteps from the houſe to the garden; this will render the houſe more dry and wholeſome, and the proſpect on entering the garden more extenſive. The firſt thing that ſhould preſent itſelf to view, ſhould be an open lawn of graſs, which ought to be conſiderably broader than the front of the building; and if the depth be one-half more than the width, it will have a better effect: if on the ſides of the lawn there are trees planted irregularly, by way of open groves the regularity of the lawn will be broken, and the whole rendered more like nature. For the convenience of walking in damp weather, this lawn ſhould be ſurrounded with a gravel walk, on the outſide of which ſhould be borders, three or four feet wide, for flowers: and from the back of theſe the proſpect will be agreeably termined by a ſlope of ever-green ſhurbs, which, however, ſhould never be ſuffered to exclude agreeable proſpects, or the view of handſome buildings. Theſe walks may lead through the different plantations, gently winding about in an eaſy natural manner, which will be more agreeable than either thoſe long ſtraight walks, too frequently ſeen in gardens, or thoſe ſerpentine windings, that are twiſted about in ſo many ſhort turns, as to render it difficult to walk in them: and as no garden can be pleaſing where there is a want of ſhade or ſhelter, theſe walks ſhould lead as ſoon as poſſible into plantations, where perſons may walk in private, and be ſheltered from the wind. Where the borders of the gardens are fenced with walls or pales, they ſhould be concealed with plantations of flowering-ſhrubs intermixed with laurels and other ever-greens, which will have a good effect, and at the ſame time conceal the fences, which are diſagreeable, when left naked and expoſed to the ſight.

Groves are the moſt agreeable parts of a garden, ſo that there cannot be too many of them; only that they muſt not be too near the houſe, nor be ſuffered to block up agreeable proſpects. To accompany parterres, groves opened in compartments, quincunxes, and arbour-work with fountains, &c. are very agreeable. Some groves of ever-greens ſhould be planted in proper places, and ſome ſquares of trees of this kind may alſo be planted among the other wood. See QUINCUNX, &c.

Narrow rivulets, if they have a conſtant ſtream, and are judiciouſly led about a garden, have a better effect than many of the large ſtagnating ponds or canals ſo frequently made in large gardens. When wilderneſſes are intended, they ſhould not be cut into ſtars and other ridiculous figures, nor formed into mazes or labyrinths, which in a great deſign appear trifling. Buildings, ſtatues, and vaſes, appear very beautiful; but they ſhould never be placed too near each other: magnificent fountains are alſo very ornamental; but they ought never to be introduced, except there be water to keep them conſtantly running. The ſame may alſo be obſerved of caſcades and other falls of water. See the articles CASCADE, FOUNTAIN, &c.

In ſhort, the ſeveral parts of a garden ſhould be diverſified; but in places where the eye takes in the whole at once, the two ſides ſhould be always the ſame. In the buſineſs of deſigns, the aim ſhould be always at what is natural, great, and noble. The general diſpoſition of a garden, and of its parts, ought to be accommodated to the different ſituations of the ground, to humour its inequalities, to proportion the number and ſorts of trees and ſhrubs to each part, and to ſhut out from the view of the garden no objects that may become ornamental. And before a garden is planned out, it ought ever to be conſidered what it will be when the trees have had twenty years growth, *Miller's Gard. Dict.*

GARDENING, branch of agriculture, containing the cultivation of gardens.

The art of gardening teaches how to lay out properly the different parts of a garden ſo as to make it not only the moſt uſeful, but alſo the moſt convenient and ornamental according to its ſituation; it likewiſe ſhews how to prepare and adapt the various kinds of ſoil for ſowing and planting the different kinds of ſeeds, trees, &c. as alſo their proper ſeaſons of ſowing and managing when growing up, according to their ſeveral natures; with the divers methods of increaſing and propagating plants, whether by cuttings, layers, grafting, inoculation, &c.

As to the ſeveral parts and operations of gardening, ſee them deſcribed under their reſpective articles, as SOWING, PLANTING, TRANSPLANTING, GRAFTING, INOCULATION, PRUNING, NURSERY, HOT-BED, GREEN-HOUSE, WALK, TERRACE, ALLEY, AVENUE, ARBOUR, GROVE, ESPALIERS, STANDARDS, &c.

GARCINIA, in botany, a tree which riſes with an upright ſtem to about twenty feet high; the branches are placed oppoſite, in pairs, ſtanding oblique to each other; the leaves are ſpear-ſhape, and entire, of a bright green on their upper ſide, and olive-coloured underneath, and about ſeven or eight inches long. The flower is roſaceous, conſiſting of four roundiſh patent petals of a dark red colour, with ſixteen erect ſtamina. The fruit is a large unilocular coriaceous berry, containing eight hairy and fleſhy ſeeds, which are convex on one ſide, angular on the other, and ſurrounded with a ſoft juicy pulp of a delicious flavour, partaking of the ſtrawberry and grape, which make it one of the richeſt fruits in the world. This tree is a native of the inland parts of Mexico and the Molucca iſlands, and is ſometimes called mangoſtan.

GARGARISM, in medicine, is ſometimes taken, in a large ſenſe, for every collution of the mouth; but, ſtrictly ſpeaking, it ſignifies a liquid medicine, appropriated to affections of the mouth, gums, fauces, larynx, and ſometimes of the head, received into the mouth, and there uſed by way of collution, without deglutition.

GARIDELLA, in botany, a genus of decandrious plants; it hath no flower petals, but, in their ſtead, are placed five long equal and bilabiated nertaria. The fruit conſiſts of three oblong compreſſed acuminated capſules, formed of two valves incloſing ſeveral ſmall ſeeds.

GARLAND, among ſailors, a ſort of net uſed by the different meſſes of a ſhip of war to hang their proviſions in, in the apartment where they eat and ſleep.

GARLIC, *Allium*, in botany, a plant with a bulbous root, conſiſting of ſeveral membranes, and is of a whitiſh colour with a purpliſh caſt; the leaves are oblong, and not fiſtulous as thoſe of the onion, but in their general characters they agree, and are therefore claſſed by Linnæus together. See ONION.

Garlic is eaſily propagated, by planting their cloves or ſmall bulbs in the ſpring, in beds about four or five inches aſunder; in the middle of June the leaves ſhould be tied in knots to prevent their running to ſeed, and then the bulb will be greatly enlarged: towards the end of July the leaves will begin to wither, and then the root ſhould be taken out of the ground, and hung up in a dry room.

Garlic is proper to warm and ſtimulate the ſolids, and to diſſolve the groſs clammy fluids, whence it is good in cold conſtitutions and in moſt aſthmas, as well as all defluxions of the breaſt; it is likewiſe very diuretic, as appears by its ſmell in the urine, and upon that account is ſerviceable in dropſies, for it will ſometimes cure it without any other medicine; but it ſhould be avoided in all inflammatory diſpoſitions and hot diſeaſes.

GARNET, among ſailors, a ſort of tackle or complication of pullies, fixed to the main-ſtay of a merchant-ſhip to hoiſt the cargo in and out at the time of lading and delivering her.

Alſo a rope fixed to the lower corners or clues of the main-ſail and fore-ſail to draw them up to the yard occaſionally, and hence called clue-garnet. See the article Clue-Garnet.

Garnet, *Granatus*, in natural hiſtory, a very beautiful gem, of a red colour, with an admixture of bluiſh.

When pure and free from blemiſhes, it is little inferior, in appearance, to the oriental ruby, tho' only of a middle degree of hardneſs between the ſapphire and common cryſtal. It is found of various ſizes, from that of a pin's-head to an inch in diameter.

Among our lapidaries and jewellers, genuine garnets are known by different names, according to their different degrees of colour. 1. The garnet, ſimply ſo called, is the fineſt and moſt valuable kind, being of a very deep blood-red, with a faint admixture of blue. 2. The rock-ruby, a name very improperly given to the garnet, when it is of a very ſtrong but not deep red, and has a fairer caſt of the blue: this is a very beautiful gem. 3. The forane or ferain garnet, that of a yet brighter red, approaching to the colour of native cinnabar, with a faint blue tinge. 4. The almandine, a garnet only a little paler than that called the rock-ruby.

Garnets are very properly diſtinguiſhed into the oriental and occidental kinds, as being found in Europe as well as the Eaſt-Indies. The oriental ones are principally brought from Calicut, Cananor, and Cambay; and the European ones are common in Italy, Hungary, and Bohemia.

Some authors have ſuppoſed the deeper coloured garnet to be the ſame with the carbuncle of the ancients, from which it really differs; ſince, on receiving the ſun's beams, it never gives ſo true a fire-colour as the carbuncle. See Carbuncle.

GARRISON, in the art of war, a body of forces, diſpoſed in a fortreſs, to defend it againſt the enemy, or to keep the inhabitants in ſubjection; or even to be ſubſiſted during the winter ſeaſon; hence, garriſon and winter-quarters are ſometimes uſed indifferently for the ſame thing; and ſometimes they denote different things. In the latter caſe, a garriſon is a place wherein focres are maintained to ſecure it; and where they keep regular guard, as a frontier town, a citadel, caſtle, tower, &c. The garriſon ſhould always be ſtronger than the townſmen.

Winter-quarters ſignify a place where a number of forces are laid up in the winter ſeaſon, without keeping the regular guard. See Winter-Quarters.

Garriſon-Town, a ſtrong place in which troops are quartered, and do duty, for the ſecurity thereof, keeping ſtrong guards at each port, and a main guard in the market-place.

Order of the GARTER, a military order of knighthood, the moſt noble and ancient of any lay-order in the world, inſtituted by king Edward III. This order conſiſts of twenty-ſix knights companions, generally princes and peers, whereof the king of England is ſovereign or chief. They are a college or corporation, having a great and little ſeal.

Their officers are a prelate, chancellor, regiſter, king at arms, and uſher of the black rod. They have alſo a dean with twelve canons, and petty canons, vergers, and twenty-ſix penſioners or poor knights. The prelate is the head. This office is veſted in the biſhop of Wincheſter, and has ever been ſo. Next to the prelate is the chancellor, which office is veſted in the biſhop of Saliſbury, who keeps the ſeals, &c. The next is the regiſter, who by his oath is to enter upon regiſtry the ſcrutinies, elections, penalties, and all other acts of the order, with all fidelity. The fourth officer is garter, and king at arms, being two diſtinct offices united in one perſon. Garter carries the rod and ſcepter at the feaſt of St. George, the protector of this order, when the ſovereign is preſent. He notifies the elections of new knights, attends the ſolemnity of their inſtallations, carries the garter to the foreign princes, &c. He is principal officer within the college of arms, and chief of the heralds. See King *at Arms*.

All theſe officers, except the prelate, have fees and penſions: The college of the order is ſeated in the caſtle of Windſor, with the chapel of St. George, and the chapter-houſe, erected by the founder for that purpoſe. The habit and enſign of the order are a garter, mantle, cap, george, and collar. The four firſt were aſſigned the knights companions by the founder; and the george and collar by Henry VIII. The garter challenges pre-eminence over all the other parts of the dreſs, by reaſon that from it the noble order is denominated; that it is the firſt part of the habit preſented to foreign princes, and abſent knights, who, and all other knights elect, are therewith firſt adorned; and it is of ſo great honour and grandeur, that by the bare inveſtiture with this noble enſign, the knights are eſteemed companions of the greateſt military order in the world. It is worn on the left leg between the knee and calf, and is enamelled with this motto, Honi soit qui ma y pense: i. e. " Shame to him that thinks evil hereof." The meaning of which is, that king Edward having laid claim to the kingdom of France, retorted ſhame and defiance upon him that ſhould dare to think amiſs of the juſt enterpriſe he had undertaken, for recovering his lawful right to that crown; and that the bravery of thoſe knights whom he had elected into this order, was ſuch as would enable him to maintain the quarrel againſt thoſe that thought ill of it.

The mantle is the chief of thoſe veſtments made uſe of upon all ſolemn occaſions. The colour of the mantle is by the ſtatutes appointed to be blue. The length of the train of the mantle only diſtinguiſhes the ſovereign from the knight companions. To the collar of the mantle is fixed a pair of long ſtrings, anciently wove with blue ſilk only, but now twiſted round, and made of Venice gold and ſilk, of the colour of the robe, with knobs, or buttons, and taſſels at the end. The left ſhoulder of the mantle has from the inſtitution been adorned with a large garter, with the device Honi soit, &c. Within this is the croſs of the order, which was ordained to be worn at all times by king Charles I. At length the ſtar was introduced, being a ſort of croſs, irradiated with beams of ſilver.

The collar is appointed to be compoſed of pieces of gold in faſhion of garters, the ground enamelled blue, and the motto gold. See Collar.

The manner of electing a knight companion into this moſt noble order, and the ceremonies of inveſtiture, are as follow:

When the ſovereign deſigns to elect a companion of the garter, the chancellor belonging to this order draws up the letters, which paſſing both under the ſovereign's ſign manual and ſignet of the order, are ſent to the perſon by garter principal king at arms, and are in this manner, or to the ſame effect:—"We, with the companions of our moſt noble order of the garter, aſſembled in chapter, holden this preſent day at our caſtle at Windſor, conſidering the virtuous fidelity you have ſhewn, and the honourable exploits you have done in our ſervice, by vindicating and maintaining our right, &c. have elected and choſen you one of the companions of our order. Therefore, we require you to make your ſpeedy repair unto us, to receive the enſigns thereof, and be ready for your inſtallation upon the —— day of this preſent month, &c."

The garter, which is of blue velvet bordered with fine gold wire, having commonly the letters of the motto of the ſame, is, at the time of election, buckled upon the left leg, by two of the ſenior companions, who receive it from the ſovereign, to whom it was preſented upon a velvet cuſhion by garter king at arms, with the uſual reverence, whilſt the chancellor reads the following admonition, enjoyned by the ſtatutes:—"To the honour of God omnipotent, and in memorial of the bleſſed martyr St. George, tye about thy leg, for thy renown, this noble garter; wear it as thy ſymbol of the moſt illuſtrious order, never to be forgotten, or laid aſide; that thereby thou mayeſt be admoniſhed to be courageous, and having undertaken a juſt war in which thou ſhalt be engaged, thou mayeſt ſtand firm, valiantly fight, and ſucceſſively conquer,"

The princely garter being thus buckled on, and the words of its ſignification pronounced, the knight elect is brought before the ſovereign, who puts about his neck, kneeling, a ſky-coloured ribbon, whereunto is appendant, wrought in gold within the garter, the image of St. George on horſeback, with his ſword drawn, encountering with the dragon. In the mean time the chancellor reads the following admonition:—"Wear this ribbon about thy neck, adorned with the image of the bleſſed martyr and ſoldier of Chriſt, St. George, by whoſe imitation provoked, thou mayeſt ſo overpaſs both proſperous and adverſe adventures, that having ſtoutly vanquiſhed thy enemies, both of body and ſoul, thou mayeſt not only receive the praiſe of this tranſient combat, but be crowned with the palm of eternal victory."

Then the knight elected kiſſes the ſovereign's hand, thanks his majeſty for the great honour done him, riſes up, and ſalutes all the companions ſeverally, who return their congratulations.

Since the inſtitution of this order, there have been eight emperors, and twenty-eight kings, beſides numerous ſovereign princes, enrolled as companions thereof. Its origin is ſomewhat differently related: the common account is, that it was erected in honour of a garter of the counteſs of Saliſbury, which ſhe dropped dancing with king Edward, and which that prince picked up; but our beſt antiquarians think it was inſtituted on account of the victory over the French at Creſſy, where the king ordered his garter to be diſplayed as a ſignal of the battle.

GAS, among chemiſts, a term made uſe of by Helmont, to ſignify, in general, ſpirit incapable of coagulation, ſuch as proceeds from fermented wine.

GASKET, among ſailors, a ſort of platted cord faſtened to the ſail-yards of a ſhip, to furl or tie up the ſail to the yard: it is uſed by wrapping it round the yard and ſail, the latter of which is rolled up cloſe to the former for that purpoſe.

GASTRO-EPILOIC Vein, a vein that opens into the vena portæ. See Vein.

GASTRIC, in general, ſomething belonging to the ſtomach. See Stomach.

Gasteric Juice, *gaſtricus ſuccus*, among phyſicians, a thin, pellucid, ſpumous, and ſaltiſh liquor, which continually diſtils from the glands of the ſtomach for the dilution of the food. See the article Food.

Gastric Vessels, in anatomy, the arteries and veins of the ſtomach. See the articles Artery and Vein.

GASTROCNEMIUS, in anatomy, the name of two thick, pretty broad, and oblong muſcles, which form a great part of what is called the calf of the leg. They are ſituated laterally with reſpect to each other under the poples.

Gastrocnemius is alſo the name of one of the extenſor-muſcles of the foot.

GASTRORAPHY, γαςροραφια, in ſurgery, the operation of ſowing up wounds of the abdomen.

GASTROTOMY, γαςροτομια, in ſurgery, the cutting open the abdomen and uterus, as in the Cæſarian ſection. See the article CÆSARIAN.

GATE, in architecture, a large door, leading, or giving entrance into a city, town, caſtle, palace, or other conſiderable building: or a place giving paſſage to perſons, horſes, coaches, or waggons, &c. As to to their proportion, the principal gates for entrance, through which coaches and waggons are to paſs, ought never to be leſs than ſeven feet in breath, nor more than twelve, which laſt dimenſion is fit only for large buildings. The height of the gate is to be 1½ of the breadth, and ſomewhat more; but as for common gates in inns, under which waggons go loaded with hay, ſtraw, &c. the height of them may be twice their breadth.

Paled GATES, ſuch as are ſet up in fences for ſhutting up the paſſages into fields, and other incloſures.

Theſe are of two ſorts, either of ſawed or cleft timber.

GATE, in the manege, the going or pace of a horſe.

GAVELET, in law, an ancient and ſpecial ceſſavit uſed in Kent, where the cuſtom of gavelkind continues, by which the tenant, if he withdraws his rent and ſervices due to the lord, forfeits his lands and tenements.

GAVELET, in London, is a writ uſed in the huſtings, given to lords of rent, in the city of London.

GAVELKIND, a tenure or cuſtom belonging to lands in the county of Kent, by which the lands of the father are, at his death, equally divided among all his ſons; or the land of a deceaſed brother, in caſe he leaves no iſſue, among all his brethren. This is by ſome called ancient ſocage-tenure; the cuſtom came from our Saxon anceſtors, among whom the inheritance of lands did not deſcend to the eldeſt, but to all the ſons alike; and the reaſon why it was retained in Kent is, becauſe the Kentiſh men were not conquered by the Normans in the time of William I.

The particular cuſtoms attending this tenure are, that the heir at the age of fifteen, may give or ſell his lands in gavelkind; and though the father is attainted of treaſon and felony, and ſuffers death, the ſon ſhall inherit. A wife ſhall be endowed of a moiety of the gavelkind-lands, of which her huſband died ſeized, during her widow-hood. Likewiſe a huſband may be tenant by curteſy of half his wife's lands, without having any iſſue by her; but if he marries again, not having iſſue, he forfeits his tenancy.

GAVELMAN, a tenant liable to pay tribute.

GAVELMED, the duty of mowing graſs, required by the lord of his cuſtomary tenants.

GAUGE, or GAGE. See GAGE.

GAUGE-LINE, on the gauging-rod. See the article GAUGING.

GAUGE-POINT, of a ſolid meaſure the diameter of a circle, whoſe area is equal to the ſolid content of the ſame meaſure. Thus, the ſolidity of a wine gallon being 231 cubic inches, if you conceive a circle to contain ſo many inches, the diameter of it will be 1715; and that will be gauge-point of wine-meaſure. And an ale gallon, containing 282 cubic inches, by the ſame rule, the gage-point for ale-meaſure will be found to be 19.15. After the ſame manner, may the gauge point of any foreign meaſure be obtained; and from hence may be drawn this conſequence, that when the diameter of a cylinder, in inches, is equal to the gauge-point of any meaſure, given likewiſe in inches, every inch in length thereof will contain an integer of the ſame meaſure, e. g. in a cylinder whoſe diameter is 17.15. inches, every inch in height contains one entire gallon in wine-meaſure; and in another, whoſe diameter is 18.95 inches, every inch in length contains one ale-gallon.

GAUGER, a king's officer who is appointed to examine all tuns, pipes, hogſheads, and barrels of wine, beer, ale, oil, honey, &c. and give them a mark of allowance, before they are ſold in any place within the extent of his office.

GAUGING, the art of meaſuring the contents of all kinds of veſſels, thereby to determine the quantity of liquids, &c. they contain.

Gauging is a branch of ſtereometry. The principal veſſels that come under its operation are pipes, barrels, rundlets, and other caſks; alſo coolers, fats, backs, ſtills, &c.

The ſolid content of cubical, parallelopipedal, and priſmatical veſſels is found in cubic inches, &c. by multiplying the area of the baſe by the perpendicular altitude. And the area of cylindrical veſſels is found by multiplying the area of the circular baſe by the penpendicular altitude.

Before the content of a caſk can be known, its form or ſhape muſt be conſidered; for though the diameters and length of one caſk may be equal to thoſe of another, yet one of them may contain ſeveral gallons more than the other; and therefore the content of all caſks cannot be found by the ſame rule. Moſt writers, therefore, in treating of this ſubject, have taken it for granted, that every common caſk is in one of the following ſolids, viz.

1. The middle fruſtrum of a ſpheroid.
2. The middle fruſtrum of a parabolical ſpindle.
3. The middle fruſtum of two parabolical conoids abutting upon one common baſe.
4. The middle fruſtum of two cones abutting upon one common baſe.

Accordingly, they have laid down rules for finding the contents of theſe ſolids, and by thoſe rules they ſuppoſe the content of any caſk may be found.

See the method of finding the area of theſe figures under their proper articles.

From what has been ſaid, it follows, that if we are not exact in aſſigning the caſk its true form, it is impoſſible we ſhould ever be exact in aſcertaining its contents. Now, it is evident to thoſe converſant in theſe affairs, that there never was any caſk in the ſhape of any one of thoſe ſolids whoſe names they bear, unleſs it can be ſuppoſed that it was affected by chance, the cooper never intending them for ſuch: and though it ſhould be admitted that a caſk may approach nearly to the form of ſuch a ſolid, yet what officer had any rule to direct in aſcertaining its true form, or to which of the varieties it belonged? Whence it follows, that the beſt method of gauging all kinds of caſks is to reduce them to cylinders; that is, to find a mean diameter between the head and the bung, whence its content will always be found exceedingly near the truth. The method is this:

To the ſquare of the bung diameter, add the ſquare of the head, and four times the ſquare of the mean diameter; multiply this ſum by the length of the caſk, and divide by 2154,3 for ale, and by 1764,71 for wine, which will give the content reſpectively.

GAUGING-*Rule* is an inſtrument commonly made of box, and ſometimes ivory, exactly a foot long, one inch and two-tenths broad, and $\frac{3}{4}$ of an inch thick; it conſiſts of four parts, viz. a rule and three ſmall ſcales or ſliding-piece fitted nicely with grooves to ſlide in it.

Four-foot GAUGING-*Rod*, a rod uſually made of box-wood, and conſiſts of four rules, each a foot long, and about half an inch ſquare, joined together by three braſs joints, by which means the rod is rendered four feet long, when the four rules are quite opened, and but one foot in length when they are folded together.

On the firſt force of this rod is placed a line of inches (and ſometimes with it a line of ale areas) decimally divided, whoſe uſe is to take dimentions neceſſary for gauging veſſels either for ale, wine, malt, &c.

Two diagonal lines are placed near the line of inches, one for ale, the other for wine.

The diagonal line of a caſk is found by putting the rod in at the bung to the interſection of the head of the veſſel, with the ſtaves oppoſite to the bung-hole.

By the bung, head, and length of a caſk, we can find its diagonal line; whence, by having the contents of two ſimilar caſks, and the diagonal of one of them given, we can find the diagonal line of the other; for as the content of any caſk, in ale or wine gallons, is to the cube of its diagonal, ſo is the content of any other caſk (ſimilar to the former) to the cube of its diagonal, whoſe cube-root is the diagonal required.

Lines adapted to the London caſks are placed on the other faces of this four-foot gauging-rod, viz. 1. a line for a butt ſtanding; 2. for a butt lying, each of which contains 108 gallons, beer-meaſure; 3. a line for a hogſhead, containing 54 gallons; 4. a line for the barrel of 36 gallons; 5. a line for a kilderkin of 18 gallons; 6. a line for a firkin of nine gallons. Then, to gauge any of theſe casks, there is no more to do than to put in your rod perpendicular at the bung, &c. and if the caſk is not full it gives you the quantity of liquor in the caſk.

For the ſame purpoſe there are alſo lines put on four-foot gauging rods for wine-meaſure; as 1. a tun of 252 gallons; 2. a butt of 126 gallons; 3. a puncheon of 84 gallons; 4. a hogſhead of 63 gallons; 5. a tierce of 42 gallons; 6. a barrel of $31\frac{1}{2}$ gallons; 7. a rundlet of 18 gallons; and, laſtly, an anchor of 10 gallons; by theſe lines all brandies and oils are gauged.

Theſe lines for London casks are made by ſetting the veſſel level, and pouring in one gallon of water, and then put the rod downright into the bung-hole (if it is a lying cask) or at the head (if a ſtanding cask) and where the ſurface of the water cuts the rods, make the diviſion for one gallon; then pour in another gallon, and where the ſurface of the water cuts the rod, make diviſions for two gallons; proceed thus by pouring in one gallon ſucceſſively after another, and make diviſions at every place on the face of the rod, to which the water riſes, till the cask be full, and then you have the ſcale for that cask properly divided. Proceed in the ſame manner for every one of the London casks above-mentioned, and all the lines will be finiſhed when figured.

Note, The diviſions for quarts, marked by dots on the rod, are made by pouring in a quart of water ſucceſſively, and that you may not be at a loſs to know what cask is in hand, the rod will ſhew you; for by meaſuring the depth of the bung, &c. if it cut 36, it is a barrel; if 18, it is a kilderkin, &c. and by the line for that cask you muſt take its ullage; that is, the quantity of liquor either drawn out, or remaining in the cask. For the uſes of the line of number, &c. ſee GUNTER's *Line*.

GAULTHERIA, in botany, a genus of plants, whoſe flower cup is a double perſiſtent perianthium, the corolla is monopetalous and ovated. The fruit is a roundiſh pentagonal depreſſed capſule, with five cells and five valves, containing a number of ſubovate angular oſſeous ſeeds.

GAUNTLET, or GANTLET. See the article GANTLET.

GAVOTTA, or GAVOTTE, is a kind of dance, the air of which has two brisk and lively ſtrains in common time, each of which ſtrains are played twice over; the firſt has uſually four or eight bars, and the ſecond contains eight, twelve, or more.

Tempi di GAVOTTA is when only the time or movement of a gavotte is imitated, without any regard to the meaſure, or number of bars or ſtrains.

GAURA, in botany, a genus of plants, whoſe flower hath four oblong petals, with eight filiform ſtamina. The fruit is an ovate tetragonal capſule, compreſſed at the angles, and contains a ſolitary oblong angulated ſeed.

GAURS, in matters of religion, an ancient ſect of the magicians in Perſia. They have a ſuburb at Iſphan, which is called Gaurabad, or the town of the Gaurs, where they are employed only in the meaneſt and vileſt drudgery: but they chiefly abound in Kerman, the barreneſt province in all Perſia, where the Mahometans ſuffer them to live with ſome freedom, and in the full exerciſe of their religion. Some years ago many of them fled into India, where their poſterity remain to this day.

They are a poor harmleſs ſort of people, zealous in their ſuperſtition, rigorous in their morals, and exact in their dealings: they profeſs the worſhip of one God alone, the belief of a reſurrection, and future judgment, and utterly deteſt all idolatry; though the Mahometans believe them to be the moſt guilty of it. It is true, they perform their worſhip before fire, for which they have an extraordinary veneration, as believing it to be the moſt perfect emblem of the deity. They have the ſame veneration, for Zoroaſter that the Jews have for Moſes, eſteeming him a prophet ſent from God.

GAWSE, or Gawze, in commerce, a very ſlight, thin, open kind of ſtuff, made of ſilk, and ſometimes of thread; there are alſo figured gawzes, and ſome with gold or ſilver flowers on a ſilk ground.

GAZONS, in fortification, pieces of freſh earth, covered with graſs, and cut in form of a wedge, about a foot long and half a foot thick, to line the outſides of works made of earth, as ramparts, parapets, &c. The firſt bed of gazons is fixed with pegs of wood; the ſecond bed ſhould be ſo laid as to bind the former, by being placed over its joint; and ſo continued till the works are finiſhed. Betwixt theſe beds it is uſual to ſow all ſorts of binding herbs, in order to ſtrengthen the rampart.

GEERS, in country affairs, the trappings and other harneſs belonging to draught-horſes or oxen.

GEESE, in ornithology. See Goose.

GEHENNA, a term mentioned in ſeveral parts of ſcripture, which our Engliſh tranſlators have rendered hell. See Hell.

GELATINOUS, in pharmacy and medicine, any thing approaching to the glutinous conſiſtence of a gelatina, or jelly.

GELD, in our old cuſtoms, a Saxon word ſignifying money, or tribute: alſo a compenſation for ſome crime committed. See the article Gild.

GELDER-Rose, in botany. See Viburnum.

GELDING, the operation of caſtrating any animal, particularly horſes.

The operation conſiſts in cutting out the teſticles: in performing which, three things are to be obſerved: firſt, regard is to be had to their age; next, to the ſeaſon of the year; and, laſtly, to the ſtate of the moon. For the firſt, if the operation is to be performed on a colt, he may be gelded at nine or at fifteen days old, if the teſticles be come down, in regard the ſooner he is gelt the better it will be for his growth, ſhape, and courage; though a horſe may be gelt at any age, if proper care be taken in the cure. As for the ſecond, the beſt time is about April or May, or elſe about the latter end of September. And for the third, the wane of the moon is the fitteſt time for performing the operation.

The manner of gelding is as follows: the beaſt being caſt down on ſome place, the operator takes the ſtones between his foremoſt and his great finger, and ſlitting the cod, preſſes the ſtones forth; then taking a pair of nippers, made very ſmooth, either of ſteel, box, or braſil-wood, he claps the ſtrings of the ſtones between them, very near to where the ſtones are ſet on, and preſſes them ſo hard, that there may be no flux of the blood; then, with a thin, drawing cauterizing iron, made red-hot, ſears away the ſtone.

This done, he takes a hard plaſter made of roſin, wax, and waſhed turpentine, well diſſolved together, and melts it on the head of the ſtrings: that being done, he ſears them, and melts more of the ſalve, till ſuch time as he has laid a good thickneſs of it upon the ſtrings.

This being done to one ſtone, the nippers are looſened, and the like is done to the other; and the two ſlips of the cod are then filled with white ſalt, and the outſide of the cod is anointed with hogs-greaſe; and thus they let him riſe, and keep him in a warm ſtable, without tying him up.

If he ſwells much in his cods or ſheath, they chaſe him up and down; and make him trot an hour in a day, and he ſoon recovers.

The manner of gelding a hog is as follows: the operator, after having made two croſs ſlips, or inciſions, on the midſt of the ſtones, preſſes them out, and anoints the ſore with tar. But another more general method, yet ſomewhat more dangerous, if not well done, is firſt to cut the ſtone on the top, and after having drawn that one forth, the operator puts in his fingerss at the ſame ſlip, and, with a lancet, cuts the ſkin between the two ſtones, and by that ſlit preſſes out the other ſtone. Then having cleanſed out the blood, he anoints the part with freſh greaſe: and thus there is but one inciſion made in the cod. Boar pigs ought to be gelt about ſix months old; yet they are commonly gelded about three weeks or a month old.

Gelding *of a lamb* may be performed from the age of three days to three weeks or more, in the following manner: one is to hold the lamb between his legs, or in his lap, and turn him on his back, holding his fore feet upright together (but if any black ſpots are ſeen in his flank, he muſt not be cut at all); then the cutter holding the tip of the cod in his left hand, cuts the lap of it an inch quite away; which done, he, with the foremoſt fingers and thumbs of both hands, ſhould ſoftly ſlip down the cod over the ſtones, to the belly, and with his teeth, holding the left ſtone in his mouth he draws it ſoftly out the length of the ſtring; after which he is to draw out the other ſtone in the ſame manner: then he ſpits in the cod, and anoints the lamb's flanks with freſh greaſe, and ſo lets him go, and keeps ſtirring him up and down for two or three hours.

GEM, *Gemma*, in natural hiſtory, a common name for all precious ſtones, of which there are two claſſes, the pellucid and ſemipellucid.

The bodies compoſing the claſs of pellucid gems are bright, elegant, and beautiful foſſils, naturally and eſſentially compound, ever found in ſmall detached maſſes, extremely hard, pellucid, and of great luſtre; compoſed of a very firm and pure matter, without any admixture of earthly ſubſtance, giving fire with ſteel, not fermenting with acid menſtruums, and very difficultly calcinable in the fire.

The bodies compoſing the claſs of ſemipellucid gems, are ſtones naturally and eſſentially compound, not inflammable nor ſoluble in water, found in detached maſſes, and compoſed of cryſtalline matter debaſed by earth: however, they are but ſlightly debaſed, and are of great beauty and brightneſs, of a moderate degree of tranſparency, and are uſually found in ſmall maſſes.

Many authors, not only among the ancients but the moderns, are full of the virtues and medicinal properties of precious ſtones, but their reputation, in this reſpect, is now greatly fallen.

Imitation or counterfeiting of GEMS *in Glaſs*. The art of imitating gems in glaſs is too conſiderable to be paſſed without notice; ſome of the leading compoſitions therein we ſhall briefly mention, upon the authority of Neri. See GLASS.

Theſe gems are made of paſtes, and are no way inferior to the native ſtones, when carefully made and well poliſhed, in brightneſs or tranſparence, but want their hardneſs. See the article PASTE.

The general rules to be obſerved in making the paſtes are theſe. 1. That all the veſſels in which they are made be firmly luted, and the lute left to dry before they are put into the fire. 2. That ſuch veſſels be choſen for the work as will bear the fire well. 3. That the powders be prepared on a porphyry ſtone, not in a metal mortar, which would communitcate a tinge to them. 4. That the juſt proportion in the quantity of the ſeveral ingredients be nicely obſerved. 5. That the materials be all well mixed, and if not ſufficiently baked the firſt time, be committed to the fire again without breaking the pot: for if this be not obſerved, they will be full of bliſters and air-bladders. 6. That a ſmall vacuity be always left at the top of the pot, to give room to the ſwelling of the ingredients.

To make paſte of extreme hardneſs, and capable of all the colours of the gems, with great luſtre and beauty.—Take of prepared cryſtal, ten pounds; ſalt of polverine, ſix pounds; ſulphur of lead, two pounds; mix all theſe well together into a fine powder; make the whole, with common water, into a hard paſte; and make this paſte into ſmall cakes of about three ounces weight each, with a hole made in their middle; dry them in the ſun, and afterwards calcine them in the ſtraighteſt part of a pott r's furnace. After this powder them, and legivate them to a perfect fineneſs on a porphyry-ſtone, and ſet this powder in pots in a glaſs furnace to purify for three days: then caſt the whole into water, and afterwards return it into the furnace, where let it ſtand fifteen days, in which time all foulneſs and bliſters will diſappear, and the paſte will greatly reſemble the natural jewels. To give this the colour of the emerald, add to it braſs thrice calcined; for a ſea-green, braſs ſimply calcined to a redneſs; for a ſapphire, add zaffer, with manganeſe; and for a topaz, manganeſe and tartar. All the gems are thus imitated in this by the ſame way of working as the making of coloured glaſſes; and this is ſo hard, that they very much approach the natural gems.

The colour of all the counterfeit gems, made of the ſeveral paſtes, may be made deeper or lighter, according to the work for which the ſtones are deſigned; and it is a neceſſary general rule, that ſmall ſtones for rings, &c. require a deeper colour, and large ones, a paler: beſides the colours made from manganeſe, verdigreaſe, and zaffer, which are the ingredients commonly uſed, there are other very fine ones which care and ſkill may prepare. Very fine red may be made from gold, and one not much inferior to that from iron; a very fine green from braſs or copper; a ſky colour from ſilver, and a much finer one, from the granater of Bohemia.

GEMARA, in Jewiſh antiquity, a collection of deciſions and determinations on the law, wrote after the Miſchna was completed.

It was called gemera, or perfection, becauſe it was conſidered as ſo perfect an explication of the law, that after it no farther additions could be made, or any thing more deſired. It was otherwiſe called the Talmud. See TALMUD.

GEMELLUS, in anatomy, the name of two muſcles, both of which are ſmall, flat and narrow, and ſituated almoſt tranſverſely one above the other, between the tuberoſity of the iſchium and the great trochanter, immediately below the pyriformis, and parted by the tendon of the obturator internus.

The ſuperior and ſmalleſt gemellus is fixed to the lower part of the ſpine of the iſchium, to the ſuperior part of the ſmall iſchiatic notch, and is continued under the acetabulum, where it is bent downwards. The inferior and largeſt gemellus is fixed to the ſuperior and back part of the tuberoſity of iſchium, and bending upwards towards the other line, together with it forms a ſort of irregular ſemicircle.

GEMINATED Column. See the article Column.

GEMINI, or the Twins, in aſtronomy, is the third in order, of the twelve zodaical conſtellations; it is repreſented by two beautiful children embracing and looking each other affectionately in the face. (See Plate LVII.) The poets ſay they repreſent Caſtor and Pollux, ſons of Jupiter and Leda, and brothers to Hellen, who, as Otway ſays,

—Was the cauſe of a long ten years war,
And laid, at laſt, old Troy in aſhes.

It conſiſts of 85 ſtars, as in the following catalogue, being all that have ever been obſerved at the Royal Obſervatory: they are reduced to the beginning of the year 1770.

Order.	Magn.	Name.	Baye Let	Right Aſcenſion.	Diſtance from Nor. Pole.	Var. in right Aſcen	Var. in Declination.
				° ′ ″	° ′ ″	′	″
1	5		H	87. 32. 9	66. 44. 43	54. 8	0. 9
2	8			88. 10. 49	66. 21. 28	54. 4	0. 8
3	8			88. 55. 55	66. 51. 56	54. 2	0. 6
4	7			89. 7. 41	66. 58. 57	54. 2	0. 4
5	7			89. 21 19	65. 32. 50	54. 8	0. 2
6	7			89. 35. 6	67. 3. 20	54. 2	0. 1
7	4		η	90. 14. 59	67. 26. 52	54. 5	0. 1
8	7			90. 33. 23	65. 58. 45	54. 6	0. 2
9	7			90. 43. 15	66. 12. 20	54. 4	0. 3
10	8			91. 12. 57	66. 19. 55	54. 4	0. 4
11	8			91. 18. 49	66. 27. 44	54. 4	0. 5
12	8			91. 19. 33	66. 39. 29	54. 2	0. 6
13	3		μ	92. 15. 40	67. 23. 21	54. 5	0. 7
14	7			92. 15. 41	68. 14. 39	53. 6	0. 8
15	7			93 30. 47	69. 5. 12	53 4	0. 9
16	7			93. 33 34	69. 23. 18	53 2	1. 0
17	8			93. 46. 17	69. 39. 37	53. 4	1. 2
18	4		ν	93. 49. 38	69. 39. 48	53. 6	1. 3
19	7			94. 34. 34	73. 57. 25	57. 6	1. 4
20	5. 8			94 43. 15	72. 4. 13	52. 7	1. 5
21	6			94. 58. 12	72. 4. 1	52. 2	1. 6
22	7			95 15. 13	70. 24. 44	52. 8	1. 7
23	5			95. 40. 47	72. 52. 5	52. 3	1. 8
24	2		λ	96. 6. 21	73. 25. 30	52. 1	2: 1
25	7			96. 41. 22	61. 36. 11	56. 4	2. 3
26	5			97. 15. 6	72. 8. 58	52. 6	2. 4
27	3		ε	97. 27. 39	64. 39. 45	55. 6	2. 5
28	5			97. 32. 38	60. 49. 8	57. 3	2. 6
29	6			97. 38. 17	60. 49. 43	56. 6	2. 7
30	6			97. 44. 30	76. 33. 29	50. 6	2. 7
31	4	1^{ma} ad	ξ	98. 4. 48	76. 52. 9	50. 4	2. 8
32	6	2^{da} ad	ξ	98. 14. 13	77. 4. 58	50. 4	2. 9
33	6			99. 6. 33	73. 33. 12	51. 6	3. 0
34	4			99. 23 29	55. 46. 37	59. 0	3. 0
35	6			99. 25. 48	67. 59. 8	58. 8	3. 1
36	6		θ	99. 29. 52	76. 20. 42	58. 2	3. 2
37	6		d	100. 17. 16	64. 21. 19	55. 2	3. 3
38	6			100. 23. 28	76. 33. 7	50. 6	3. 4
39	6		e	101. 9. 4	63. 28. 11	55. 4	3. 5
40	6			101. 18. 31	63. 47. 14	55. 4	3. 5
41	6			101. 44. 51	73. 41. 39	51. 6	3. 6
42	6			102. 5 1	65. 27. 53	54. 6	3. 7
43	6	1^{ma} ad	w	102. 5. 39	65. 28. 40	55. 1	3. 7
44	4		z	102. 26. 54	69. 6. 45	53. 7	3. 9
45	6. 7	2^{da} ad	w	102. 51. 29	67. 2. 8	53. 5	3. 9
46	6		o	104. 9. 15	62. 46. 35	57. 2	4. 2
47	5		τ	104. 6. 48	59. 23. 59	57. 7	4. 4
48	6			104. 35. 57	63. 53. 0	54. 6	4. 5
49	6			104. 36. 36	65. 30. 25	55. 1	4. 6
50	6		m	104. 46. 21	74. 28. 6	51. 2	4. 9
51	5			105. 2. 19	73. 28 14	51. 9	5. 2
52	6		n	105. 8. 18	64 43. 50	54. 8	5. 3
53	6			105. 23. 58	61. 45. 37	56. 0	5. 4
54	5			106. 13. 3	73. 3. 51	52. 1	5. 5
55	3		δ	106. 35. 40	67. 36. 57	54. 2	5. 7
56	5		q	107. 5. 26	69. 8. 32	53. 5	5. 8
57	5		A	107. 21. 24	64. 31. 39	55. 3	5. 8
58	7			107. 24. 13	66. 37. 17	54. 0	5. 9
59	6			104. 33. 15	61. 56. 22	56. 4	6. 0
60	5		z	107. 51. 26	61. 45. 55	56. 4	6. 1
61	6		r	108 20. 34	69. 17. 57	53. 4	6. 2
62	5		p	108. 31. 6	68. 6. 15	53. 8	6. 3
63	5			108. 33. 48	57. 56. 38	57. 6	6. 3
64	6	1^{ma} ad	l	108. 44. 39	61. 25. 38	6. 6	6. 4
65	6	2^{da} ad	b	108. 52. 8	61. 37. 49	56. 4	6. 5
66	1	Caſtor	α	109. 58. 28	57. 37. 44	58. 2	6. 6
67	7			110. 3. 12	73. 53. 18	57. 4	6. 7
68	6		k	110. 6. 54	73. 41. 33	57. 7	6. 8
69	5		v	110. 25. 45	62. 39. 4	55. 9	6. 8
70	5			110. 49. 11	54. 27. 7	59. 2	6. 9
71	5		o	110. 59. 46	54. 55. 56	58. 8	7. 0
72	6			111. 16. 21	61. 26. 48	56. 0	7. 1
73	6			111. 23. 9	61. 39. 42	55. 8	7 2
74	5		f	111. 32. 45	71. 49. 14	52. [illegible]	7. 3
75	5		σ	112. 13. 4	71. 34. 47	52. 4	7. 4
76	6		c	112. 30. 50	63. 41. 12	55. 4	7. 6
77	5		κ	112. 38. 7	65. 4. 11	54. 8	7. 7

Order.	Magn.	Name.	Bayer Let	Right Aſcenſion.	Diſtance from Nor. Pole.	Var. in right Aſcen	Var. in Decli-nation.
				° ″	° ′ ″	″	′
78	2	Pollux	β	112 48.29	61.26.14	56.3	7.7
79	7			112.54. 5	69. 8.46	52.8	7.8
80	5		π	113. 7.51	56. 1. 7	58.2	7.8
81	6		g	113.11.58	70.56.50	52.6	7.9
82	6			113.42. 4	66.19.14	54.0	8.0
83	5		ρ	114.50.50	62.39 30	55 6	8.1
84	4			114.50.47	67. 5. 4	73 6	8.2
85	6		b	115.33.16	69.30.56	52.6	8.3

GEMMA, *Gem*, in natural hiſtory. See the article GEM.

Sal GEMMÆ is the pureſt and fineſt foſſile ſalt, and an extremely fine and beautiful foſſil. It is conſiderably hard and firm, and at leaſt as pellucid as rock-cryſtal; but is frequently coloured throughout with a milky-white, which takes off greatly from its luſtre; and as cryſtal is liable to be tinged with red, green, and yellow, ſo as to reſemble rubies, ſapphires, emeralds, and topazes, ſo this ſalt is ſometimes tinged with theſe ſeveral colours; but rarely preſerves the tranſparency of cryſtal under the ſame circumſtances. See the article SALT.

GENDARMES, or GENS D'ARMES, in the French armies, a denomination given to a ſelect body of horſe, on account of their ſucceeding the ancient gendarmes, who were thus called from their being completely cloathed in armour.

The king's body guards, the light-horſe of the royal houſe, and the muſqueteers, are at preſent reputed to belong to the gendarmerie.

The grand gendarmes are a troop compoſed of about two hundred and fifty gentlemen, who guard the king's perſon: The king himſelf is their captain, and one of the prime peers their captain-lieutenant, who has under him two lieutenants, three enſigns, three guidons, and other officers. There are beſides theſe, gendarmes of the queen, the dauphin, &c.

GENDER, *Genus*, among grammarians, a diviſion of nouns, or names, to diſtinguiſh the two ſexes. See NOUN and SEX.

This was the original intenſion of gender; but, afterwards, other words, which had no proper relation either to the one ſex or the other, had genders aſſigned them, rather out of caprice than reaſon; which is at length eſtabliſhed by cuſtom. Hence genders vary according to the languages, or even according to the words introduced from one language into another. Thus, *arbor*, in Latin, is feminine; but *arbre*, in French, is maſculine: and *dens*, in Latin, is maſculine; but dent, in French, is feminine. Nay, a gender has ſometimes changed in the ſame language, according to time and occaſion. Thus, *alvus*, according to Priſcian, was anciently maſculine, but afterwards became feminine and *navire* was anciently feminine in French, but is now maſculine. In Engliſh we have no genders; indeed we expreſs the difference of ſex by different words; as boar, ſow; boy, girl, &c. We have alſo twenty-four feminines diſtinguiſhed from the males by varying the termination of the females into eſs; as actor, actreſs; prince, princeſs; heir, heireſs, &c. and we have a few words in which the feminine is diſtinguiſhed from the maſculines by the termination ix, as executor, executrix; adminiſtrator, adminiſtratix, &c. which is all our language knows of any thing like genders.

The eaſtern languages, as well as the vulgar languages of the weſt, have only two genders, the maſculine and the feminine. The Greek and Latin have beſides, the neuter, common, and doubtful genders. This laſt indeed is not common, for it properly belongs only to the names of ſome animals, which are promiſcuouſly joined both to maſculine and feminine adjectives, to expreſs their male or female, as *bos*, *canis*, *ſus*, &c. They have alſo the epicœne gender, which is not a different one, but ſerves promiſcuouſly for either; including both the kinds under one ſingle gender and termination: thus *vulpes*, a fox, though it ſignifies either the male or female, is really of the feminine gender, in Latin. And ſo *cuſtodiæ*, watchmen or centinels, are really feminine, though they ſignify men. This is common to all languages that have them. The Latin and Greek, in the neuter gender, do not regard them, having no relation to the male or female ſex, but what fancy gives them, and the termination of certain words.

The Oriental languages frequently neglect the uſe of genders; and the Perſian language has none at all, which is no diſadvantage: the diſtinction of genders being entirely uſeleſs.

GENEALOGY, γενεαλογια, an enumeration of a ſeries of anceſtors; or a ſummary account of the relations and alliances of a perſon or family, both in the direct and collateral line.

GENERAL TERMS, among logicians, thoſe which are made the ſigns of general ideas.

All things that exiſt, Mr. Locke obſerves, being particulars, it might be expected that words ſhould be ſo too in their ſignification: but we find it quite contrary; for moſt of the words that make all languages are general terms. This is the effect of reaſon and neceſſity. For,

Firſt, it is impoſſible that every particular thing ſhould have a diſtinct name, becauſe it is impoſſible to have diſtinct ideas of every particular thing, to retain its name, with its peculiar appropriation to that idea.

Secondly, It would be uſeleſs, unleſs it could be ſuppoſed to have theſe ſame ideas in their minds: for names applied to particular things, whereof I alone have the ideas in my mind, could not be ſignificant er intelligible to another, who is not acquainted with all thoſe particular things which have fallen under my notice.

Thirdly, It would be of no great uſe for the improvement of knowledge; which, though founded in particular things, enlarges itſelf by general views; to which things, reduced into ſorts under general names are properly ſubſervient.

In things where we have occaſion to conſider and diſcourſe of individuals and particulars, we uſe proper names: as in perſons, countries, cities, rivers, mountains, &c. Thus we ſee that jockeys have particular names for their horſes, becauſe they often have occaſion to mention this or that particular horſe, when he is out of ſight.

Afterwards, obſerving that a great many things reſemble each other in ſhape, and other qualities we frame a geral idea that takes in only the qualities in which thoſe many particulars agree; and to this idea we give the name *man*, for example, in which there is nothing new; that which is peculiar to each individual being left out, and only what is common to all retained. And thus we come to have a general idea, and a general name. By the ſame method the mind proceeds to more general notions and names, as thoſe of animal, ſubſtance, being, thing, and ſuch univerſal terms as ſtand for any ideas whatſoever.

As to the ſignification of general words, it is evident they do not barely ſignify one particular thing; neither do they ſignify a plurality. But they ſignify a genus, kind, or ſort of things. See the article ABSTRACTION and GENUS.

GENERAL *of an Army*, in the art of war, he who commands in chief. See ARMY.

A general ought to be a man of great courage and conduct, to have great experience, and to be of good quality. His conduct appears in eſtabliſhing his magazines in convenient places; in examining the country, that he may not engage his troops too far, while he is ignorant of the means of bringing them off; in ſubſiſting them; and in knowing how to take the moſt advantageous poſts, either for fighting or ſhunning a battle. His experience inſpires his army with confidence, and an aſſurance of victory; and his quality, by creating reſpect, augments his authority. By his liberality he gets intelligence of the ſtrength and deſigns of the enemy, and by this means is enabled to take the moſt ſucceſsful meaſures. A general ought likewiſe to be fond of glory, to have an averſion to flattery, to render himſelf beloved, and to keep a ſtrict diſcipline.

The office of a general is to regulate the march and encampment of the army; in the day of battle to chuſe out the moſt advantageous ground; to make the diſpoſition of the army; to poſt the artillery; and where there is occaſion, to ſend his orders by aids de camp. At a ſiege he is to cauſe the place to be inveſted; to order the approaches and attacks to viſit the works, and to ſend out detachments to ſecure his convoys.

GENERAL is alſo uſed for a particular march, or beat of drum; being the firſt which gives notice, commonly in the morning early, for the infantry to be in readineſs to march.

GENERATING *Line*, or *Figure*, in geometry, is that which by its motion produces any other plane or ſolid figure. Thus, a right line moved any way parallel to itſelf, generates a parallelogram; round a point in the ſame plane, with one end faſtened in that point, it generates a circle. One entire revolution of a circle, in the ſame plane, generates the cycloid; and the revolution of a ſemi-circle round its diameter, generates a ſphere, &c. See the articles CYCLOID, SPHERE, &c.

GENERATION, *Generatio*, in phyſiology, the act of procreating and producing a thing which before was not; or, according to the ſchoolmen, it is the total change or converſion of one body into a new one, which retains no marks of its former ſtate. Thus, we ſay, fire is generated, when we perceive it to be where before there was only wood, or other fuel: in the ſame manner a chick is ſaid to be generated, when we perceive it, where before there was only an egg; or the egg is changed into the form of a chick.

In generation, there is not properly any production of new parts; but only a new modification, or manner of exiſtence, of the old ones.

When almighty God, ſays Dr. Blair, created the world, he ſo ordered and diſpoſed of the *materies mundi*, that every thing produced from it ſhould continue ſo long as the world ſhould ſtand. Not that the ſame individual ſpecies ſhould always remain; for they were in proceſs of time to periſh, decay, and return to the earth from whence they came; but that every like ſhould produce its like, every ſpecies produce its own kind, to prevent a final deſtruction of the ſpecies, or the neceſſity of a new creation. For which end, he laid down certain regulations, by which each ſpecies was to be propagated, preſerved, and ſupported, till, in order and courſe of time, they were to be removed hence: for without that, thoſe very beings, which were created at firſt, muſt have continued to a final diſſolution of all things; which almighty God of his infinite wiſdom, did not think fit. But that he might ſtill the more manifeſt his omnipotence, he ſet all the engines of his providence to work, by which one effect was to produce another, by means of certain laws or rules, laid down for the propagation, maintenance, and ſupport of all created beings. This his divine providence is called nature, and theſe regulations are called the laws or rules of nature, by which it ever operates in its ordinary courſe; and whatever recedes from that, is ſaid to be preternatural, miraculous, or monſtrous.

Generation *of Animals.*—According to Ariſtotle, the males contain the principle, and the females the matter of generation: for though both were furniſhed, indeed, with a ſeminal liquor, yet the ſemen of the males alone was prolific. The moderns, on the other hand, as well thoſe who contend for the ſyſtem of generation from eggs, as they who adopt that of the animalcules in the male ſeed, pretend that females have no ſuch ſeminal liquor at all, and that what was commonly taken for it was ſome other animal fluid.

There are great and many difficulties which attend the moſt plauſible account of the firſt formation of the parts of an animal, and the beginning of motion in its fluids: for though both reaſon and experience convince us, that all the parts of an animal did exiſt before generation, yet, how this matter comes to aſſume ſo very different a form, as that of an embryo, is by no means agreed on.

Harvey is of opinion, that all females are furniſhed with eggs, and that the embryos, or young animals, are formed in the ſame manner as a chick in the egg of any bird. Generation, according to this celebrated phyſician, is effected only by means of the uterus, or womb, which conceives the fœtus by a kind of contagion communicated to it by the male ſeed, much in the ſame way as a load-ſtone communicates magnetiſm to iron. This contagion, he thinks, acts not only on the uterus, but is communicated to the whole body of the female, which is altogether prolific; though the uterus he aknowledges is the only part that is capable of conceiving the fœtus, juſt as the brain is alone capable of forming ideas and notions. Agreeably to this doctrine of Harvey, Steno, and other anatomiſts, have pretended to diſcover certain eggs in the ovaries or teſticles of women; which Mr. Buffon denies to be the caſe, affirming that there are no ſuch eggs to be found in the teſticles of women.

We cannot enter into a detail of the reaſonings for and againſt the ſyſtem of generation from eggs, and ſhall therefore only obſerve, that its advocates pretend to have diſcovered eggs in all the females on which they made obſervations; that the largeſt of thoſe found in women did not exceed the bigneſs of a pea; that they are extremely ſmall in young girls under fourteen, but that age and commerce with men makes them grow larger; that there are more than twenty ſuch eggs in each ovary or teſticle; that they are fecundated in the ovary by the ſpirituous and volatile part of the male-ſeed; that they afterwards are detached and fall into the uterus through the Fallopian tubes; that here the fœtus is formed of the internal ſubſtance of the egg, and the placenta of the exterior part. See the article Foetus.

Leewenhoek is the author of another ſyſtem of generation, from animalcules in the male ſeed. He tells us, he diſcovered many thouſands of theſe in a drop leſs than a grain of ſand. Theſe are found in the ſemen of all males whatever, but not in that of females; and are ſo ſmall, that 3,000,000,000 of them are not equal to a grain of ſand, whoſe diameter is but the hundredth part of an inch. When any of theſe animalcules gets into an egg, fit to receive it, and this falls into the womb through the Fallopian tubes, the humous which diſtil through the veſſels of the womb, penetrating the coats of the egg, ſwell and dilate it, as the ſap of the earth does ſeed thrown into it. The placenta begins to appear like a little cloud, upon one ſide of the external coat of the egg; and, at the ſame time, the ſpine of the embryo-animalcule is grown ſo big, as to become viſible; and a little afterwards, the cerebrum and cerebellum appear like two bladders; and the eyes ſtand next goggling out of the head; then the beating of the heart, or punctum ſaliens, is plainly to be ſeen; and the extremities diſcover themſelves laſt of all.

The animalcules are of different figures, ſome like tadpoles, and others like eels. In the ſemen of a man, and in that of a dog, there have been diſcovered two different kinds of them, the one ſuppoſed to be males, and the other females. Some even pretend to have ſeen animalcules diſengage themſelves from the membranes that ſurround them; and that they then appeared perfectly like men, with legs, arms, &c. like thoſe of the human body.

All the advocates for the ſyſtem of generation from animalcules ſtrongly oppoſe that from eggs. They contend, that theſe animalcules cannot be looked upon as the inhabitants of the ſemen, ſince they were of greater extent than the liquor itſelf, not to mention that no ſuch animals are found in any other liquors of the body; and ſince females have nothing ſimilar to theſe animals, they think it manifeſt that the prolific principle reſides in the males. When they are aſked, to what purpoſe ſerves ſuch an immenſe profuſion of human animalcules, they anſwer, that it is agreeable to the ordinary courſe of nature, both in the animal and vegetable part of the creation. They likewiſe ſtrengthen their ſyſtem, by alledging the many examples we have of ſimilar transformations in the inſect-claſs of animals, which from caterpillars and ſmall worms, become winged animals of the butterfly, or fly-kinds.

By this ſyſtem, ſays Mr. Buffon, the firſt woman cannot be ſaid to have contained the whole race of mankind, as being all, according to it, the true poſterity of the firſt man, and in their animalcule-ſtate contained only in him. On this principle he proceeds to invalidate the ſyſtem of generation from animalcules: for ſuppoſing the ſize of a man to be 1, then will that of one of the ſpermatic animalcules be $\frac{1}{10000000000}$; and as a man is to an animalcule of the firſt generation in the ſame ratio, that this animalcule is to an animalcule of the ſecond generation, it follows that this will be expreſſed by the fraction $\frac{1}{1000000000000000000}$. In this manner he computes the ſize of the animalcules of ſeveral generations, all ſuppoſed to be living animals, notwithſtanding that their minuteneſs exceeds the power of imagination to conceive; and then tells us, that the ſyſtem of generation from eggs is liable to the ſame objections, whereof the detail may be ſeen in his *Hiſt. Natur. tom.* 2. *p.* 157, *& ſeq.*

As to Buffon's own ſyſtem, he thinks that every part, both of animals and vegetables, contains an infinite number of organic molecules; that theſe molecules aſſume ſucceſſively different forms, and are put into different motions, according to the circumſtances they are in; but that they are much more numerous in the ſeminal liquors of both ſexes, and the ſeeds of plants, than in other parts; that theſe organic molecules make the matter of nutrition; that this matter is always active, and tends to organization, forming itſelf into different ſhapes, according to the moulds it meets with. When the quantity of this organic matter is but ſmall, as in man, and moſt large animals, generation only takes place at the age of maturity, and even then the number of animals produced is but ſmall. The caſe is juſt the reverſe in animals which abound with this matter, as in fiſhes, and moſt birds.

With reſpect to the generation of mankind, the ſame author thinks it a certain fact, that the male-ſeed is received into the womb of the woman; and that, for this purpoſe, it is highly probable the internal orifice opens during the act of coition. The female-ſeed alſo makes its way into the womb, where being mixed with that of the male, they both together contribute to the formation of the fœtus; which is either male or female, according as the ſeed of the man or woman abounds moſt with organic molecules; and the infant reſembles either the father or mother, according to the different combinations of theſe molecules. Both theſe ſeminal liquors he thinks equally active in the formation of the fœtus, and that they fix and counterballance each other; the molecules of each parent being thereby determined to form ſimilar parts to thoſe of the individual that furniſhed them, as the head, trunk, arms, legs, &c. He thinks the molecules proceeding from the genital parts fix themſelves firſt; and that the other molecules arrange themſelves ſucceſſively round theſe, in the ſame order which they before occupied in the parent. When a great quantity of the ſeminal liquors of both ſexes is received into the womb, there are formed different ſpheres of attraction in different parts of theſe liquors; the conſequence of which is that ſeveral fœtuſes are formed at the ſame time. See VEGETATION.

Nearly a-kin to Mr. Buffon's ſyſtem is that of Mr. Maupertuis, which he has explained in his *Venus Phyſique.* He obſerves, that all the variety, obſervable among mankind, may have been accidental at firſt; but being once eſtabliſhed in the conſtitution of the parents, they become natural to their poſterity. To illuſtrate this, he gives an inſtance of a ſexdigitary family at Berlin, who had ſix fingers, or ſix toes, and frequently both; and that this peculiarity was tranſmitted equally by the father and mother, but was loſt by alliances with thoſe who had but the uſual number of fingers or toes.

He farther obſerves, that moſt animals, excepting mankind, have ſtated ſeaſons for procreation, and that the females go with young ſome a longer, others a ſhorter time. Mares go from eleven to twelve months; cows and hinds go nine months; and bitches go only ſeven weeks; cats nine weeks; and rabbits but thirty one-days. Moſt birds are hatched in twenty-one days, the canary birds, and ſome others, are hatched in thirteen or fourteen days. It appears, therefore, that there is an endleſs variety in the time and manner of the generation of animals.

Thoſe who deſire a more full account of theſe ſyſtems of generation may conſult Harvey, Leewenhoek, Buffon, &c.

Parts of GENERATION. The parts of generation, in men, are the teſticles, vaſa deferentia, veſiculæ ſeminales, and penis. See the article TESTICLE, &c.

Thoſe, in women, are the pudendum or vulva, the clitoris, numphæ, vagina, uterus or womb, ovaries, and Falopian tubes. See the articles PUDENDUM, CLITORIS, &c.

GENERATION *of Fiſhes.* The opinion of moſt naturaliſts, that the female fiſhes firſt depoſit their ſpawn, and that the males afterwards eject the ſemen upon it, is denied by Linnæus; who thinks it impoſſible that the eggs of any animal ſhould be impregnated out of its body. He thinks it much more probable, that the males always eject their ſemen ſome time before the females depoſit their ſpawn; and that, by ſwallowing this ſemen, the ſpawn is impregnated in the body of the fiſh. Nay, he tells us, that he himſelf ſaw three or four females, in the ſpawning time, gather about the male, and greedily ſwallow the ſemen he ejected. This he obſerved in ſome ſpecies of the eſox, pearch, and eſpecially the cyprinus; but he recommends farther enquiry to be made on this ſubject.

GENERATION *of Inſects* is now certainly known to be from eggs; which the female depoſits in places, where, at a proper ſeaſon, they are hatched into animals like their parents; or into maggots, or worms, which, after ſeveral transformations, at laſt appear in the form of their parents.

GENERATION *of Plants.* The impregnation of the female palm-tree by the male, has been known in the moſt ancient times. Herodotus, the father of hiſtory, tells us, that the Greeks called ſome of theſe trees male, the fruit of which they bound to the other kind, which bears dates; that the ſmall flies, wherewith the male abounded, might aſſiſt in ripening the fruit of the female-tree. The remote age in which Herodotus wrote, ſufficiently apologies for his believing, that what was really brought about by the farina fœcundans of the male flower, was to be attributed to the inſects frequently found therein, and which perhaps frequently carry this farina from the male to the female. The proceſs of impregnation, according to Theophraſtus, was this: while the male plant was in flower, they cut off a branch of theſe flowers, and ſcattered the duſt and down therein upon the flowers of the female plant; by which means the female did not caſt her fruit, but preſerved them to maturity. This has been lately verified at Berlin, where a female palm-tree bore fruit for many years; but the fruit never ripened, and when planted, did not vegetate, merely becauſe there was no male palm in the place: for having procured a branch of male flowers from from Leipſic, twenty German miles from Berlin, they ſuſpended it over the female flowers of their tree; and the experiment ſucceeded ſo well, that the female tree produced more than an hundred perfectly ripe fruit; and the experiment being repeated, it bore above two thouſand ripe fruit, which being planted produced young trees.

It is in the flowers of vegetables only, that the parts ſubſervient to generation are produced; and theſe flowers are either male, female, or hermaphrodite. Male flowers are thoſe poſſeſſed of the organs of generation, analogous to the male parts of animals; ſuch are the ſtamina and apices, called, by Linnæus, filaments and antheræ. The female flowers are only endowed with parts like thoſe which perform the office of generation in females; and theſe are the piſtil and its appurtenances, which Linnæus divides into three parts, the germen, ſtyle, and ſtigma. The hermaphrodite flower, which conſtitutes the great bulk of the vegetable creation, is poſſeſſed of all theſe parts in itſelf, and is therefore capable of propagating its ſpecies without any foreign aſſiſtance; which, by many inconteſtable experiments, it has been found neither the male nor female flower ſimply is able to do. The impregnation of hermaphrodite flowers may be performed within their own calyx; but before a ſeparate female flower can be ſo, the farina fœcundans of the male flower muſt neceſſarily be conveyed to it through the circumambient air; which is the reaſon why the quantity of the produce of ſuch plants is much more precarious, than that of plants which have hermaphrodite flowers: for if, during the flowering of theſe ſeparate male and female plants, the weather proves either very wet or ſtormy, their produce of fruit will be very inconſiderable, from the ſpoiling or haſty diſſipation of the male farina. Thus, independent of froſts, the fruit of the nut and filbert-tree will be moſt numerous in thoſe years, in which the months of January and February are the leaſt ſtormy and wet, becauſe at that time their flowers are produced. For the ſame reaſons, a ſtormy or wet May deſtroys the cheſnuts; and the ſame weather, in July, prodigiouſly leſſens the crop of maiz, or Indian corn, as its ſpikes of male-flowers ſtand lofty, and at a conſiderable diſtance from the female.

Some of the more ſkilful modern gardeners put in practice, with regard to melons and cucumbers, the very method mentioned by Theophraſtus two thouſand years ago, in regard to the palm-tree. As theſe plants, early in the ſeaſon, are in the climate confined to frames and glaſſes, the air in which they grow is more ſtagnant than the open air; whereby the diſtribution of the farina fœcundans, ſo neceſſary towards the production of the fruit for the propagation of the ſpecies, is much hindered. To obviate the inconvenience thence ariſing, they collect the male flowers when fully blown; and preſenting them to the female ones by a ſtroke of the finger, they ſcatter the farina fœcundans therein, which prevents the falling of the fruit before it is ripe.

By far the greater part of plants produce hermaphrodite flowers; but ſome there are which have ſeparate male and female-flowers growing from the ſame root, as maiz, nettles, box, elm, birch, oak, beech, hazel, horn-beam, plane-tree, pine, fir, cypreſs, ceder, melons, cucumbers, gourds, and ſeveral others; in many of theſe, the male and female flowers ſtand at a conſiderable diſtance. There are other plants which produce thoſe neceſſary organs upon different roots, as the palm-tree, hops, the willow-tree, miſletoe, ſpinach, hemp, poplar, french and dog's mercury, the yew-tree, juniper, and ſeveral others. Among theſe, the valliſneria of Linnæus, as to the manner in which its male-flower impregnates the female, is one of the moſt ſingular prodigies in nature. It grows in rivulets, ditches, and ponds, in many parts of Europe. The male plant, which is continually covered with water, has a ſhort ſtalk, upon the top of which its flowers are produced. As this top never reaches the ſurface of the water, the flowers are thrown off from it, and come unopened to the ſurface of the water; where, as ſoon as they arrive, by the action of the air, they expand themſelves, and ſwim round the female flowers, which are blown at the ſame time. Theſe laſt have a long ſpiral foot-ſtalk, by which they attain the ſurface of the water, and remaining there in flower a few days are impregnated by the male-flowers detached from the ſtalk at the bottom.

It is obſervable, that the operations of nature are carried on moſt uſually by certain general laws, from which however ſhe ſometimes deviates. Thus almoſt all plants have either hermaphrodite flowers, or male and female flowers, growing from the ſame root, or male and female flowers from different roots; but there are a few of another claſs, which from the ſame root furniſh either male hermaphrodite flowers, or female and hermaphrodite ones: of this kind are the mulberry-tree, the muſa, or plantane-tree, white hellebore, pellitory, arrach, the aſh-tree, and few others.—*Watſon*, in Phil. Tranſ. Vol XLVII. p. 169—183.

Some object to this theory of the generation of plants, from having obſerved ſome plants, which were termed female, growing ſingly; and though at a very great diſtance from any male plants of the ſame kind, producing perfect fruits, which grew when ſown. Mr. Miller tells us, he himſelf was ſtaggered in his opinion, on having obſerved a female plant of white briony, which grew ſingly in a garden, where there were no other plants of the ſame kind; which, nevertheleſs, for ſeveral years, produced berries, which grew and flouriſhed perfectly well. This put him upon examining the plant more carefully than he had done before. when a great many male-flowers were found intermixed with the female ones; and he adds, that he has frequently obſerved the ſame in many other plants, which are generally male and female in diſtinct plants, yet have ſometimes both ſexes on the ſame plant.

From what has been ſaid, it appears very plain, that the embryo of the female flower muſt be impregnated by the farina fœcundans, or male duſt, in order to render the fruit perfect; but how, or in what manner, it is performed, is what we can only gueſs at; ſince, in the generation of animals, our greateſt naturaliſts differ widely, as has been ſhewn above, in their opinions concerning the particular method how it is performed. If, ſays the reverend Dr. Hales, I may be allowed to indulge conjecture, I would propoſe it to the conſideration of naturaliſts, whether, from the manifeſt proof we have that ſulphur attracts air, a hint may not a hint be taken to enquire whether this may not be the primary uſe of the farina fœcundans, to attract and unite with itſelf, elaſtic or other refined active particles. That this farina abounds with ſulphur, and that a very refined ſort, is probable from the ſubtile oil which chemiſts obtain from the chives of ſaffron: and if this be the uſe of it, was it poſſible that it could be more aptly placed than on the ſlender points of the ſtamina, where it might eaſily, with the leaſt breath of wind, be diſperſed in the air; thereby ſurrounding the plant, as it were, with an atmoſphere of ſublimed ſulphureous pounce? Theſe uniting with particles of air, may, perhaps, be inſpired at ſeveral parts of the plant, and eſpecially at the piſtil, and be thence conveyed to the capſula ſeminalis. And if to theſe united ſulphureous and aerial particles, we ſuppoſe ſome particles of light to be joined (for Sir Iſaac Newton has found that ſulphur attracts light ſtrongly); then the reſult of theſe three by far the moſt active principles in nature will be a punctum ſaliens, to invigorate the ſeminal plant: and thus we are at laſt conducted, by the regular analyſis of vegetable nature, to the firſt enlivening principle of their minuteſt origin.

GENERICAL NAMES, among philoſophers, the ſame with general terms. See the article GENERAL TERMS, ſupra.

GENESIS, among mathematicians, ſignifies the formation or production of ſome figure or quantity.

GENESIS, among divines, a canonical book of the Old Teſtament, and the firſt of the Pentateuch, or five books of Moſes. The Hebrews call it Bereſchith, or, In the beginning, theſe being the firſt words in the book. The Greeks gave it the name of Geneſis, from its beginning with the hiſtory of the creation of the world. It includes the hiſtory of two thouſand three hundred and ſixty-nine years, and beſides the hiſtory of the creation, contains an account of the original innocence and fall of man; the propagation of mankind; the riſe of religion; the general defection and corruption of the world; the deluge; the reſtoration of the world; the diviſion and peopling of the earth; and the hiſtory of the firſt patriarchs down to Joſeph, at whoſe death it ends.

It was eaſy for Moſes to be ſatisfied of the truth of what he delivers in this book, becauſe it came down to his time through a very few hands. For, from Adam to Noah, there was one man (Methuſelah) who lived to ſee them both: in like manner, from Noah to Abraham, Shem converſed with them both; Iſaac alſo did with Abraham and Joſeph, from whom theſe things might eaſily be conveyed to Moſes by Amram, who was cotemporary with Joſeph. Moſes is ſuppoſed to have written this book, during his retirement in the land of Midian, before he conducted the Iſraelites out of Egypt.

GENET, GENNET, or JENNET, in the manege, denotes a ſmall ſized, well proportioned Spaniſh horſe.

GENETHLIACUM, or GENETHLIAC POEM, verſes made on the birth of ſome prince, or other illuſtrious perſon, in which the poet, by a kind of prediction, promiſes him great advantages, great proſperity, and glorious victories.

GENEVA, a city near the confines of France and Switzerland, on the river Rhone, about ſixty miles north-weſt of Lyons: eaſt long. 6°, north lat. 46° 20′. Geneva is a fortified town, about two miles in circumference, ſituated at the weſt-end of a lake ſixty miles long, and twelve broad, called the lake of Geneva. It is a republic, governed by a council of two hundred, and a ſenate of twenty-five member; and is ſaid to contain thirty-thouſand inhabitants.

GENEVA, or Gin, among diſtillers, an ordinary malt-ſpirit, diſtilled a ſecond time, with the addition of ſome juniper-berries. See the article Juniper.

Originally, the berries were added to the malt in the grinding; ſo that the ſpirit thus obtained was flavoured with the berries from firſt, and exceeded all that could be made by any other method. At preſent, they leave out the berries entirely, and give their ſpirits a flavour by diſtilling them with a proper quantity of oil of turpentine; which, though it nearly reſembles the juniper-berries, has none of their valuable virtues.

GENIAL, an epithet given by the pagans to certain gods who were ſuppoſed to preſide over generation.

GENICULI, among botaniſts, the knots or joints in the ſtalks of plants; whence they are denominated geniculate plants.

GENIOGLOSSI, in anatomy, two muſcles which lie immediately under the geniohyoidæus. They ariſe fleſhy from the fore-part of the lower jaw internally, and inlarging themſelves, are inſerted in the root of the tongue. When theſe act, they pull the tongue forwards, and thruſt it out of the mouth.

GENIOHYOIDÆUS, in anatomy, is a muſcle which ariſes in the middle of the chin, above the mylohyoides, and near the ſynchondroſis of the jaw: its termination is in the baſe of the os hyoides. See the articles Mylohyoides, Synchondrosis, &c.

GENIPA, in botany, a genus of plants whoſe flower is monopetalous and rotated, the tube is very ſhort, and funnel-ſhaped, and the border large, and cut into five parts; it includes five reflexed ſubulated filaments, topped with roundiſh antheræ. The fruit is an ovate fleſhy berry, ſmall at each end, truncated and bilocular, containing a number of depreſſed angulated ſeeds.

GENIS, a town of Savoy. ſituated on the river Guier, twelve miles weſt of Chamberry.

GENISTA, Green-Weed, or Dyers-Weed, a genus of plants, with papilionaceous flowers; and the fruit a roundiſh, turgid, and unilocular pod, containing a ſingle kidney-like ſeed.

GENITIVE, in grammar, the ſecond caſe of the declenſion of nouns. The regulation of one thing conſidered as belonging in ſome manner to another, has occaſioned a peculiar termination of nouns, called the genitive caſe: But in the vulgar tongues, they make uſe of a ſign to expreſs the relation of this caſe. In Engliſh they prefix the particle *of*, in French *de*, or *du*, &c. though in ſtrictneſs there are no caſes in either of theſe languages; inaſmuch as they do not expreſs the different relations of things by different terminations, but by additional prepoſitions, which is otherwiſe in the Latin, &c.

In the Hebrew tongue, the genitive caſe is marked in a very different manner from that of the Greek and Latin; for whereas in thoſe languages the noun governed is varied, in the Hebrew the noun governing undergoes the alteration.

GENIUS, a good or evil ſpirit, or dæmon, whom the ancients ſuppoſed ſet over each perſon, to direct his birth, accompany him in life, and be his guard.

Genius, in matters of literature, &c. a natural talent or diſpoſition to do one thing more than another; or the aptitude a man has received from nature to perform well and eaſily that which others can do but indifferently, and with a great deal of pains.

GENS D'ARMES. See Gendarmes.

GENTIAN, *Gentiana*, in botany, a genus of plants whoſe flower conſiſts of a ſingle petal, tubulated and imperforated at the baſe, and divided into five ſegments at the top, which are various in figure; the ſtamina are five ſubulated filaments, ſhorter than the corolla, topped with ſingle antheræ. The fruit is an oblong pointed capſule, ſlightly bifid at the top, formed of two valves with one cell; the ſeeds are numerous and ſmall, the receptacles are two, which grow to the valves of the capſule.

There are ſeveral ſpecies of gentian; the officinal ſort, whoſe root is large, tough, and of a yellowiſh colour, produces oblong oval leaves of a yellowiſh green, with five large veins on the back of each, diminiſhing in ſize to the top of the ſtalk, which is three or four feet high, from the upper part of the ſtalk; at the joints come out the flowers ſtanding on ſhort footſtalks, growing in whorles, and are of a pale yellow colour; it grows naturally among the Alps, Pyreenes, and other mountains; alſo in Germany, from whence its root is brought to us for medicinal uſe, which is uſually preſcribed as a bitter, to ſtrengthen the ſtomach and help digeſtion, it is alſo ſaid to be a certain remedy for agues, and one of the beſt known medicines againſt the plague: externally it is frequently uſed by ſurgeons to dilate ulcers and wounds.

GENTIANELLA, a ſpecies of gentian, is a low plant, the flowers grow erect, are large, of a beautiful deep blue, and flowers in May; it is increaſed by parting its roots in autumn, or by ſowing its ſeeds at the ſame time of the year.

GENTILE, in matters of religion, a pagan, or worſhipper of falſe gods.

GENUS, among metaphyſicians and logicians, denotes a number of beings, which agree in certain general properties, common to them all: ſo that a genus is nothing elſe but an abſtract idea, expreſſed by ſome general name or term.

It is plain, therefore, that by a genus we do not barely ſignify one particular thing, nor yet a plurality of things; but a ſort or kind of things, all agreeing in certain general properties.

Thus animal is ſaid to be a genus in reſpect of man and brute, in regard man and brute agree in the common nature and character of animal: ſo a right lined figure of four ſides, is a genus in reſpect of a parallelogram, and a trapezium; and ſo likewiſe is ſubſtance, in reſpect of ſubſtance extended, which is body; and thinking ſubſtance, which is mind.

GENUS is alſo uſed for a character or manner applicable to every thing of a certain nature or condition: in which ſenſe it ſerves to make capital diviſions in divers ſciences, as muſic, rhetoric, anatomy, and natural hiſtory.

GENUS, in muſic, by the ancients called *genus melodiæ*, is a certain manner of dividing and ſubdividing the principles of melody; that is, the conſonant and diſſonant intervals into their concinnous parts.

GENUS, in natural hiſtory, a ſub-diviſion of any claſs or order of natural beings, whether of the animal, vegetable, or mineral kingdoms, all agreeing in certain common characters.

The genera of animals ought to be eſtabliſhed upon the moſt natural, obvious, and diſtinctive characters. Thus it would be abſurd to range the ox and hog under the ſame genus, notwithſtanding they both have divided hoofs; and it would be equally ſo to make the roe deer, rain-deer, and elk, belong to different genera, merely becauſe the figure of their horns differs conſiderably. Hence the characters of the genera of animals are to be taken from the figure, ſituation, number, and proportions of their parts; which conſtitute ſuch a reſemblance, as eaſily diſtinguiſhes them from the ſpecies of any other genus.

In the claſs of quadrupeds, beſides a general reſemblance, the different genera are diſtinguiſhed from each other by the number and figure of their teeth, the ſhape of their feet, horns, and the like.

In the claſs of birds, the generical characters are drawn from the ſhape of their beak, and the number and diſpoſition of their toes.

In the claſs of amphibious animals, the generical characters are founded on the number of the cruſts or ſcales on the bellies and tails of the ſerpent-kind, and on the figure of the tail, and the number and ſhape of toes in the lizard, frog, and tortoiſe kinds.

As to the genera of fiſhes, they are founded on a certain agreement between a number of ſpecies, ariſing from the ſimilitude of their eſſential external parts; which always conſiſt in the ſituation of theſe parts, for the moſt part alſo in number, and frequently in their figure and proportion.

The inſect-claſs are diſtinguiſhed into genera, from the number, figure, &c. of their antennæ, feet, ſnout, &c.

With reſpect to the vegetable kingdom, all plants and trees are reduced to genera from the conſideration of the number, ſituation, figure, and proportion of the parts of fructification.

In the ſame manner, the genera of foſſils are eſtabliſhed upon the figure, hardneſs, conſiſtence, inflammability, and other obvious properties of the ſubſtances that compoſe the mineral kingdom.

GEOCENTRIC, in aſtronomy, is applied to a planet or its orbit, to denote it concentric with the earth, or as having the earth for its center, or the ſame centure with the earth. See the article EARTH and PLANET.

What we have here ſaid of the latitude of Venus, is likewiſe true of that of Mercury, and upon the ſame account. See HELIOCENTRIC and LATITUDE.

GEOCENTRIC *Latitude of a Planet*, is its diſtance from the ecliptic, meaſured on a great circle perpendicular thereto, as ſeen from the earth, and is thus found:

As the ſine of the angle of commutation is to the ſine of the elongation, ſo is the tangent of inclination (or planets heliocentric latitude) to the tangent of its geocentric latitude.

GEOCENTRIC *Longitude of a Planet*, is its longitude as ſeen from the earth, and is thus found:

To the difference of the logarithms of the diſtance of the ſun from the earth, and of the certain diſtance of the planet from the ſun, add radius, the ſum ſhall be the logarithm tangent of an angle, from which ſubtract 450, and to the logarithm tangent of the remainder, add the logarithm tangent of half the angle of commutation, their ſum, leſſened by radius, ſhall be the logarithm tangent of an angle, which added to half the angle of commutation of a ſuperior planet (or ſubtracted from it if an inferior planet) will give the elongation of that planet: but, when half the angle of commutation exceeds three ſines, its complement to ſix ſines muſt be increaſed or diminiſhed, by the angle above found to give the elongation.

Now, if the angle of commutation be leſs than ſix ſines, the elongation of a ſuperior planet ſubtracted from the ſun's longitude, or the elongation of an inferior planet added thereto, will give the planet's geocentric longitude; but if the angle of commutation exceeds ſix ſines, the contrary muſt be obſerved in either caſe.

GEODÆSIA, the ſame with ſurveying. See the article SURVEYING.

GEOGRAPHICAL MILE, the ſame with the ſea-mile; being one minute, or the ſixtieth part of a degree of a great circle on the earth's ſurface. See the article DEGREE.

GEOGRAPHY, the doctrine or knowledge of the terreſtrial globe; or the ſcience that teaches and explains the ſituation and extent of countries, its diviſion into land and ſea, &c.

Geography, as defined by Varenius, is that part of mixed mathematics, which explains the ſtate of the earth, and of its parts depending on quantity, viz. its figure, place, magnitude, and motion, with the celeſtial appearances, &c. In conſequence of this definition, that author divides geography into general and ſpecial, or univerſal and particular.

By univerſal geography, is underſtood, that part of the ſcience which conſiders the whole earth in general, and explains its properties without regard to particular countries. This diviſion is diſtinguiſhed into three parts, abſolute, relative, and comparative. The abſolute part reſpects the body of the earth itſelf, its parts and peculiar properties, as its figure, magnitude, and motion; its lands, ſeas, and rivers, &c. The relative part accounts for the appearances and accidents that happen to it from celeſtial cauſes; and, laſtly, the comparative contains an explanation of thoſe properties which ariſe from comparing different parts of the earth together.

Special or particular geography, is that diviſion of the ſcience which deſcribes the conſtitution and ſituation of each ſingle country by itſelf; and is two-fold, viz. chorographical, which deſcribes countries of a conſiderable extent; or topographical, which gives a view of ſome place, or ſmall tract of the earth.

Hence the object or ſubject of geography is the earth, eſpecially its ſuperficies and exterior parts.

Geography is very ancient, at leaſt the ſpecial part thereof; for the ancients ſcarce went beyond the deſcription of countries. It was a conſtant cuſtom among the Romans, after they had conquered and ſubdued any province, to have a map or painted repreſentation thereof, carried in triumph, and expoſed to the view of the ſpectators. Hiſtorians relate, that the Roman ſenate, about an hundred years before Chriſt, ſent geographers into divers parts to make an accurate ſurvey and menſuration of the whole globe, but they ſcarce ever ſaw the twentieth part of it.

Before them, Necho, king of Egypt, ordered the Phœnicians to make a ſurvey of the whole coaſt of Africa, which they accompliſhed in three years. Darius procured the Ethiopic ſea, and the mouth of the Indus, to be ſurveyed; and Pliny relates, that Alexander, in his expedition into Aſia, took two geographers to meaſure and deſcribe the roads; and that from their itineraries, the writers of the following ages took many particulars. Indeed, this may be obſerved, that whereas moſt other arts and ſciences are ſufferers by war, geography and fortification alone have been improved thereby. Geography, however, muſt have been exceedingly defective, as a great part of the globe was then unknown, particularly all America, the northern parts of Europe and Aſia, with the Terra Auſtralis, and Magellanica; and as they were ignorant of the earth's being capable to be ſailed round, and of the torrid zone's being habitable, &c.

The honour of reducing geography to art and ſyſtem, was reſerved for Ptolemy, who, by adding mathematical advantages to the hiſtorical method in which it had been treated of before, has deſcribed the world in a much more intelligible manner: he has delineated it under more certain rules, and by fixing the bounds of places from longitude and latitude, hath diſcovered other miſtakes, and has left us a method of diſcovering his own.

The principal writers upon geography, among the ancients, are Ptolemy, Pliny, and Strabo: amang the moderns, Joannes de Sacroboſco, Cluverius, Heylin, Ricciolus, Weigelius, de Chales, and, above all, Varenius, with Jurin's additions; to which may be added Leibnecht, Sturmius, Morden, Gordon, Salmon, &c.

GEOMETRICAL, in general, an appellation given to whatever belongs to, or is ſtrictly connected with, geometry. See the article GEOMETRY.

GEOMETRICAL *Conſtruction of Equations.* See the article CONSTRUCTION.

GEOMETRICAL CURVE. See CURVE.

GEOMETRICAL LOCUS, or PLACE. See the article LOCUS.

GEOMETRICAL PACE. See PACE.

GEOMETRICAL PLANE, in perſpective. See the article PLANE.

GEOMETRICAL PROGRESSION and PROPORTION. See PROGRESSION and PROPORTION.

GEOMETRICAL *Solution of a Problem*, is when it is ſolved according to the rules of geometry, and by ſuch lines as are truly geometrical, and agreeable to the nature of the problem.

GEOMETRY, of γη, earth, and μετρον, to meaſure, and originally meant no more than the meaſuring of the earth, that is ſurveying of land; but, like many other ſciences, has outgrown its name; for by geometry is now to be underſtood the whole ſcience of extenſion and magnitude, and contemplates the nature and properties of all ſorts of figures, abſtractly conſidered, without any regard to matter.

The origin of geometry is doubtleſs very ancient, and it is generally thought that the Chaldeans were firſt poſſeſſed of this noble ſcience, and that it was taught the Egyptians by Abraham when he went from Ur of the Chaldees to ſojourn there; but though this is the opinion of many able and learned men, yet it is by no means to be made out: but this we are certain of, that the Egyptians were the firſt people that cultivated geometry, being compelled thereto by neceſſity, the mother of inventions, in order to aſcertain to every man his legal property and eſtate, in a country where boundaries and land-marks were ſwept away and confounded by yearly inundations.

That the Egyptians, in their ancient, free, monarchical ſtate, were acquainted with ſome of the ſimple elements and eaſy problems in Geometry, is not denied; but we cannot believe they made any great improvements in the abſtruſe parts thereof, ſince to Pythagoras (the famous philoſopher of Samos, who flouriſhed ſo low as about five hundred and twenty years before Chriſt, and who had lived twenty-two years in Egypt) was attributed the invention of the thirty-ſecond and forty-ſeventh propoſitions of the firſt of Euclid; for the latter of which he conceived ſo much joy, that he is ſaid to have offered an hecatomb. A diſcovery of this kind, in later times, would have been entitled but to a ſmall ſhare of honour, and the want of knowing theſe propoſitions muſt needs make their geometry very coarſe and imperfect.

From Egypt geometry travelled into Greece; for Thales the Mileſian, who flouriſhed five hundred and eighty-four years before Chriſt, was the firſt of the Greeks, who, coming into Egypt, transferred geometry from thence into Greece: he is reputed, certainly, beſides other things, to have found out the fifth, fifteenth, and twenty-ſixth propoſitions of Euclid's firſt book; and the ſecond, third, fourth, and fifth, of the fourth book. The ſame perſon improved aſtronomy, for he began to obſerve the equinoxes and ſolſtices, and was the firſt who foretold an eclipſe of the ſun.

After him was Pythagoras, of Samos, before mentioned: this man much improved and adorned the mathematic ſciences, and ſo attached was he to arithmetic in particular, that almoſt his whole method of philoſophizing was taken from numbers: he firſt of all abſtracted geometry from matter, in which elevation of mind he found out ſeveral of Euclid's propoſitions. He firſt laid open the matter of incommenſurable magnitudes, and the five regular bodies.

Next flouriſhed Anaxagoras, of Clazomenæ, and Œnopides, of Chios: theſe were followed by Briſo, Antipho, and Hippocrates, of Chios; which three, for attempting the quadrature of the circle, were reprehended by Ariſtotle, and, at the ſame time, celebrated: then came Democritus, Theodorus, Cyrenæus, and Plato, than whom no one brought greater luſtre to the mathematical ſciences; he amplified geometry with great and notable additions, beſtowing incredible ſtudy upon it, and, above all, the art analytic, or of reſolution, was found out by him; the moſt certain way of invention and reaſoning. Upon the door of his academy was read this inſcription, *ȣδεις αγεωμετρητος εισιτω.* Thirteen of his familiar acquaintance are commemorated by Proclus, as men by whoſe ſtudies the mathematics were improved. After theſe were Leon, and Eudoxus, of Cnidos, a man great in arithmetic, and to whom we owe the whole fifth book of the Elements; Xenocrates, and Ariſtotle. To Ariſteus, Iſidore, and Hypſicles, moſt ſubtile geometricians, we are indebted for the books of ſolids. Afterwards Euclid gathered together the inventions of others, diſpoſed them into order, improved them, and demonſtrated them more accurately, and left to us thoſe elements, by which youth is every where inſtructed in the mathematics. He died two hundred and eighty-four years before Chriſt. Almoſt an hundred years after, followed Eratoſthenes, and Archimedes; the writings of the firſt are loſt, but we have many remains of the latter. The very name of Archimedes gives an idea of the top of human ſubtilty, and the perfection of the whole mathematical ſciences; his wonderful inventions have been delivered to us by Polybius, Plutarch, Tzetres, and others. He was the firſt who was able to give the exact quadrature or menſuration of a ſpace, bounded by the arch of a curve and a right line, which he did by demonſtrating that the ſegment of a parabola is to its inſcribed triangle, as 4 : 3. Cotemporary with him was Conon; and at no great diſtance of time was Apollonius, of Perga; another prince in geometry, called, by way of encomium, the Great Geometrician. We have extant four books of conics in his name; though ſome think Archimedes was the author of them: we have alſo three books of ſpherics by Theodoſius the Tripolitine. In the year ſeventy, after Chriſt, appeared Claudius Ptolomæus, the prince of aſtronomers, a man not only moſt ſkilful in aſtronomy, but in geometry alſo, as many other things by him written do witneſs, but eſpecially his books of ſubtenſes. After theſe flouriſhed Eutocius, Cteſibius, Proclus, Pappus, and Theon. Then enſued a long period of ignorance; arts and ſciences, liberty and learning, being driven away and over-run by that brutiſh heard of Northern barbarians, whoſe whole excellence was in their bones and muſcles, and feats of chivalry their higheſt ambition. During this diſmal night of ignorance, doubtleſs, many curious diſcoveries, and uſeful pieces of knowledge were totally loſt, and the remainder buried, as it were, in ruins, till the late reſtoration of learning, upon the taking of Conſtantinople by the Turks, in the year one thouſand four hundred and fifty-one, after Chriſt; whereby the reſidue of Greek and Roman learning was driven for refuge into Italy, and the other neighbouring countries of Europe.

Geometry has always been valued for its extenſive uſefulneſs, but has been moſt admired for its true and real excellence, which conſiſts in its perſpicuity and perfect evidence: it may, therefore, be of uſe to conſider the nature of the demonſtrations, and the ſteps by which the ancients were able, in ſeveral inſtances, from the menſuration of right-lined figures; to judge of ſuch as were bounded by curve lines; for as they did not allow themſelves to reſolve curvilinear figures into rectilinear elements, it is worth while to examine, by what art they could make a tranſition from the one to the other.

They found that ſimilar triangles are to each other in the duplicate ratio of their homologous ſides; and by reſolving ſimilar polygons into ſimilar triangles, the ſame propoſition was extended to theſe polygons alſo. But when they came to compare curvilineal figures, which cannot be reſolved into rectilineal parts, this method failed. Circles are the only curvilineal plain figures conſidered in the elements of geometry. If they could have allowed themſelves to have conſidered theſe as ſimilar pologons of an infinite number of ſides, (as ſome have ſince done, who pretend to abridge their demonſtrations) after proving that any ſimilar pologons inſcribed in circles, are in the duplicate ratio of their diameters, they would have immediately extended this to the circles themſelves, and would have conſidered 2 Euc. 12. as an eaſy corollary from the firſt: but there is reaſon to think they would not have admitted a demonſtration of this kind, for the old writers were very careful to admit no precarious principles, or ought elſe but a few ſelf-evident truths, and no demonſtrations but ſuch as were accurately deduced from them. It was a fundamental principle with them, that the difference of any two unequal quantities, by which the greater exceeds the leſſer, may be added to itſelf till it ſhall exceed any propoſed finite quantity of the ſame kind: and that they founded their propoſitions concerning curvilineal figures upon this principal, in a particular manner, is evident from the demonſtrations, and from the expreſs declaration of Archimedes, who acknowledges it to be a foundation upon which he eſtabliſhed his own diſcourſes, and cites it as aſſumed by the ancients in demonſtrating all the propoſitions of this kind: but this principle ſeems to be inconſiſtent with the admitting of an infinitely little quantity or difference, which, added to itſelf any number of times, is never ſuppoſed to become equal to any finite quantity ſoever.

They proceeded, therefore, in another manner, leſs direct indeed, but perfectly evident. They found that the inſcribed ſimilar polygons, by having the number of their ſides increaſed, continually approached to the areas of the circles; ſo that the decreaſing difference between each circle and its inſcribed polygon, by ſtill further and further diviſions of the circular arches, which the ſides of the polygon ſubtend, could become leſs than any quantity that could be aſſigned; and that all this while the ſimilar polygons obſerved the ſame conſtant invariable proportions to each other, viz. that of the ſquares of the diameters of the circles. Upon this they founded a demonſtration, that the proportion of the circles themſelves could be no other than that ſame invariable ratio of the ſimilar inſcribed polygons. For they proved, by the doctrine of propoportions only, that the ratio of the two inſcribed polygons cannot be the ſame as the ratio of one of the circles to a magnitude leſs than the other, nor the ſame as the ratio of one of the circles to a magnitude greater than the other; therefore the ratio of the circles to each other, muſt be the ſame as the invariable ratio of the ſimilar polygons inſcribed in them, which is the duplicate of the ratio of the diameters.

In the ſame manner the ancients have demonſtrated, that pyramids of the ſame height are to each other as their baſes, that ſpheres are as the cubes of their diameters, and that a cone is the one third part of a cylinder on the ſame baſe, and of the ſame height. In general, it appears from their way of demonſtration, that when two variable quantities, which always have an invariable ratio to each other, approach at the ſame time to two determined quantities, ſo that they may differ leſs from them than by any aſſignable meaſure; the ratio of theſe limits or determined quantities muſt be the ſame as the invariable ratio of the two variable quantities: and this may be conſidered as the moſt ſimple and fundamental propoſition in this doctrine, by which we are enabled to compare curvilineal ſpaces in ſome of the more ſimple caſes.

The next improvement in the way of demonſtrating among the ancient geometricians, ſeems to be that which we call the method of exhauſtions, which, for the further illuſtration of this ſubject, may be repreſented thus.

Suppoſe there are two curvilineal ſpaces, ACB and MON (See the figure in the plate) wherein are drawn parallellograms, whoſe breadth may be continually diminiſhed: it is then obvious, that the firſt circumſcribing, and laſt inſcribing figures, may be made to differ from that curvilineal ſpace ACB, and from each other, by leſs than any ſpace, how minute ſoever, that ſhall be named; *i.e.* the circumſcribed figure can be made leſs than any ſpace that exceeds the curve, and the inſcribed figure greater than any ſpace that is leſs than the curve.

If by conſidering the properties of theſe inſcribed and circumſcribed figures, which ariſe from the nature of the curve they are adapted to, a right-lined ſpace LMN may be aſſigned, that ſhall be greater than every inſcribed figure, and leſs than every circumſcribed figure, this right-lined ſpace LMN may be proved to be equal to the curvilineal ſpace ACB.

For were it greater, a circumſcribed figure might be made leſs; and if it were leſs, an inſcribed figure might be made greater.

If, therefore, parallelograms, whoſe breadth may be any how diminiſhed, are drawn inſcribing and circumſcribing theſe curves; and if they are deſcribed in ſuch a manner, that the circumſcribed figure of one curve to the circumſcribed figure of the other, and the inſcribed to the inſcribed, has one and the ſame conſtant proportion in every deſcription: I ſay, that the curve figure ACB, is to the curve MON, in the ſame proportion which the inſcribed and circumſcribed figures conſtantly bear to each other.

For no ſpace greater than A C B can have to M O N this ratio, ſince if it could, a figure might be circumſcribed about A C B leſs than this ſuppoſed greater ſpace; and this circumſcribed figure, to the correſponding figure circumſcribing M O N, would be in the ſame ratio as the ſuppoſed greater ſpace to the curve M O N; *i. e.* four quantities being in the ſame proportion, the firſt would be leſs than the third, and the ſecond greater than the fourth. Nor can any ſpace leſs than A C B have to M O N the conſtant ratio of the figures in one curve to the figures in the other. For if it could, a figure might be inſcribed within A C B, which would be greater than this ſuppoſed leſſer ſpace; and this inſcribed figure, to its correſpondent figure inſcribing M O N, would be in the ſame ratio as this imagined leſſer ſpace to the curve M O N; *i. e.* four quantities being in the ſame proportion, the firſt would be greater than the third, and the ſecond leſs than the fourth. Thus no ſpace but A C B can be to M O N in the conſtant ratio of the circumſcribed and inſcribed figures.

In the manner here deſcribed did the ancient geometricians demonſtrate whatever they diſcovered relating to the dimenſions or proportion of curve lines, curvilineal ſpaces, and ſolids bounded by curve ſurfaces; and of which, Sir Iſaac Newton's doctrine of prime and ultimate ratios, is no other than an abbreviation or improvement in the form.

Archimedes, indeed, takes a different way for comparing the ſpheroid with the cone and cylinder, that is more general, and has a nearer analogy to the modern methods. He ſuppoſes the terms of a progreſſion to increaſe conſtantly by the ſame difference, and demonſtrates ſeveral properties of ſuch a progreſſion relating to the ſum of the terms, and the ſum of their ſquares; by which he is able to compare the parabolic conoid, the ſpheroid, and hyperbolic conoid, with the cone; and the area of his ſpiral line with the area of the circle. There is an analogy betwixt what he has ſhewn of theſe progreſſions, and the proportions of figures demonſtrated in the elementary geometry; the conſequence of which may illuſtrate his doctrine, and ſerve, perhaps, to ſhew that it is more regular and complete in its kind than ſome have imagined. The relation of the ſum of the terms to the quantity that ariſes by taking the greateſt of them as often as there are terms, is illuſtrated by comparing the triangle with a parallelogram of the ſame height and baſe; and what he has demonſtrated of the ſum of the ſquares of the terms compared with the ſquare of the greateſt term, may be illuſtrated by the proportion of the pyramid to the priſm, or of the cone to the cylinder, their baſes and heights being equal; and by the ratios of certain fruſtums or proportions of theſe ſolids deduced from the elementary proportions. He appears ſollicitous, that his demonſtrations ſhould be found to depend on thoſe principles only, that had been univerſally received before his time. In his treatiſe of the quadrature of the parabola, he mentions a progreſſion, whoſe terms decreaſe conſtantly in the proportion of four to one; but he does not ſuppoſe this progreſſion to be continued to infinity, or mention the ſum of an infinite number of terms; though it is manifeſt, that all which can be underſtood by thoſe who aſſign that ſum, was fully known to him. He appears to have been more fond of preſerving to the ſcience all its accuracy and evidence, than of advancing paradoxes; and contents himſelf with demonſtrating this plain property of ſuch a progreſſion, That the ſum of the terms continued at pleaſure, added to the third part of the laſt term, amounts always to $\frac{4}{3}$ of the firſt term: nor does he ſuppoſe the chords of the curve to be biſected to infinity; ſo that after an infinite biſection, the inſcribed polygon might be ſaid to coincide with the parabola. Theſe ſuppoſitions had been new to the geometricians in his time, and ſuch he appears to have carefully avoided.

This is a ſummary account of the progreſs that was made by the ancients in meaſuring and comparing curvilineal figures, and of the method by which they demonſtrated their theorems of this kind. It is often ſaid, that curve lines have been conſidered by them as polygons of an infinite number of ſides; but this principle no where appears in their writings: we never find them reſolving any figure or ſolid into infinitely ſmall elements: on the contrary, they ſeem to have avoided ſuch ſuppoſitions, as if they judged them unfit to be received into geometry, when it was obvious, that their demonſtrations might have been ſometimes abridged by admitting them. They conſidered curvilineal areas as the limits of circumſcribed or inſcribed figures, of a more ſimple kind, which approach to theſe limits (by a biſection of lines or angles, continued at pleaſure) ſo that the difference between them may become leſs than any given quantity. The inſcribed or circumſcribed figures were always conceived to be of a magnitude and number that is aſſignable; and from what had been ſhewn of theſe figures, they demonſtrated the menſuration, or the proportions of the curvilineal limits themſelves, by arguments *ab abſurdo.* They had made frequent uſe of demonſtrations of this kind from the beginning of the elements; and theſe are, in a particular manner, adapted for making a tranſition from right-lined figures, to ſuch as are bounded by curve lines. By admitting them only, they eſtabliſh the more difficult and ſublime part of their geometry, on the ſame foundation as the firſt elements of the ſcience; nor could they have propoſed to themſelves a more perfect model.

But as theſe demonſtrations, by determining diſtinctly all the ſeveral magnitudes and proportions of theſe inſcribed and circumſcribed figures, did frequently extend to very great lengths, other methods of demonſtrating have been contrived by the moderns, whereby to avoid theſe circumſtantial deductions. The firſt attempt of this kind known to us, was made by Lucas Velerius; but afterwards, Cavalerius, an Italian, about the year 1635, advanced his method of indiviſibles, in which he propoſes, not only to abbreviate the ancient demonſtrations, but to remove the indirect form of reaſoning uſed by them, of proving the equality or proportion between lines and ſpaces, from the impoſſibility of their having any different relation; and to apply to theſe curved magnitudes the ſame direct kind of proof that was before applied to right-lined quantities.

This method of comparing magnitudes, invented by Cavalerius, ſuppoſes lines to be compounded of points, ſurfaces of lines, and ſolids of planes; or, to make uſe of his own deſcription, ſurfaces are conſidered as cloth, conſiſting of parallel threads; and ſolids are conſidered as formed of parallel planes, as a book is compoſed of its leaves, with this reſtriction, that the threads or lines, of which ſurfaces are compounded, are not to be of any conceivable breadth, nor the leaves or planes of ſolids of any thickneſs. He then forms theſe propoſitions, that ſurfaces are to each other, as all the lines in one to all the lines in the other; and ſolids, in like manner, in the proportion of all the planes.

This method exceedingly ſhortened the former tedious demonſtrations, and was eaſily perceived; ſo that problems, which at firſt ſight appeared of an inſuperable difficulty, were afterwards reſolved, and came, at length, to be deſpiſed, as too ſimple and eaſy: the menſuration of parabolas, hyperbolas, ſpirals of all the higher orders, and the famous cycloid, were among the early productions of this period. The diſcoveries made by Torricelli, de Fermat, de Roberval, Gregory, St. Vincent, &c. are well known. They who have not read many authors, may find a ſynopſis of this method in Ward's Young Mathematician's Guide, where he treats of the menſuration of ſuperficies and ſolids.

Notwithſtanding, as this method is here explained, it is manifeſtly founded on inconſiſtent and impoſſible ſuppoſitions; for while the lines, of which ſurfaces are ſuppoſed to be made up, are real lines of no breadth, it is obvious, that no number, whatever, of them, can form the leaſt imaginable ſurface: if they are ſuppoſed to be of ſome ſenſible breadth, in order to be capable of filling up ſpaces, i. e. in reality to be parallelograms, how minute ſoever be their altitude, the ſurfaces may not be to each other in the proportion of all ſuch lines in one, to all the like lines in the other; for ſurfaces are not always in the ſame proportion to each other with the parallelograms inſcribing them.

The ſame contradictory ſuppoſitions do obviouſly attend the compoſition of ſolids by parallel planes, or of lines by ſuch imaginary points.

This heterogenious compoſition of quantity, and confuſion of its ſpecies, ſo different from that diſtinctneſs, for which the mathematics were ever famous, was oppoſed at its firſt appearance by ſeveral eminent geometricians, particularly by Guldinus and Tacquet, who not only excepted to the firſt principles of this method, but taxed the concluſions formed upon it as erroneous. But as Cavalerius took care, that the threads or lines of which the ſurfaces to be compared together were formed, ſhould have the ſame breadth in each (as he himſelf expreſſes it) the concluſions deduced by his method, might generally be verified by ſounder geometry; ſince the compariſon of theſe lines was, in effect, the comparing together the inſcribed figures.

As in the application of this method, error, by proper caution, might be avoided, the aſſiſtance it ſeemed to promiſe in the analytical part of geometry, made it eagerly followed by thoſe who were more deſirous to diſcover new propoſitions, than ſolicitous about the elegance or propriety of their demonſtrations. Yet ſo ſtrange did the contradictory conception appear, of compoſing ſurfaces out of lines, and ſolids out of planes, that, in a ſhort time, it was new modelled into that form, which it ſtill retains, and which now univerſally prevails among the foreign mathematicians, under the name of the differential method, or the analyſis of infinitely littles.

In this reformed notion of indiviſibles, ſurfaces are now ſuppoſed as compoſed not of lines, but of parallelograms, having infinitely little breadths and ſolids, in like manner as found of priſms, having infinitely little altitudes. By this alteration it was imagined, that the heterogeneous compoſition of Cavalerius was ſufficiently evaded, and all the advantages of his method retained. But here, again, the ſame abſurdity occurs as before; for if by the infinitely little breadth of theſe parallelograms, we are to underſtand what theſe words literally import, i. e. no breadth at all; then they cannot, any more than the lines of Cavalerius, compoſe a ſurface; and if they have any breadth, the right lines bounding them cannot coincide with a ſurface bounded by a curve line.

The followers of this new method grew bolder than the diſciples of Cavalerius, and having tranſformed his points, lines, and planes, into infinitely little lines, ſurfaces, and ſolids, they pretended, they no longer compared together heterogeneous quantities, and inſiſted on their principles, being now become genuine; but the miſtakes they frequently fell into, were a ſufficient confutation of their boaſts; for, notwithſtanding this new model, the ſame limitations and cautions were ſtill neceſſary:

for inſtance, this agreement between the inſcribing figures and the curved ſpaces to which they are adapted, is only partial; and in applying their principles to propoſitions already determined by a juſter method of reaſoning, they eaſily perceived this defect; both in ſurfaces in ſolids, it was evident, at firſt view, that the perimeters diſagreed. And as no one inſtance can be given, where theſe indiviſible or infinitely little parts do ſo completely coincide with the quantities they are ſuppoſed to compound, as in every circumſtance to be taken for them, without producing erroneous concluſions, ſo we find, where a ſurer guide was wanting, or diſregarded, theſe figures were often imagined to agree, where they ought to have been ſuppoſed to differ.

The *Arithmetica Infinitorum* of Dr. Wallis, was the fulleſt treatiſe of this kind that appeared before the invention of fluxions. Archimedes had conſidered the ſums of the terms in an arithmetical progreſſion, and of their ſquares only, (or rather the limits of theſe ſums only) theſe being ſufficient for the menſuration of the figures he had examined. Dr. Wallis treats this ſubject in a very general manner, and aſſigns like limits for the ſums of any powers of the terms, whether the exponents be integers or fractions, poſitive or negative. Having diſcovered one general theorem that includes all of this kind, he then compoſed new progreſſions from various aggregates of theſe terms, and enquired into the ſums of the powers of theſe terms, by which he was enabled to meaſure accurately, or by approximation, the areas of figures without number: but he compoſed this treatiſe (as he tells us) before he had examined the writings of Archimedes; and he propoſes his theorems and demonſtrations in a leſs accurate form: he ſuppoſes the progreſſions to be continued to infinity, and inveſtigates, by a kind of induction, the proportion of the ſum of the powers, to the production that would ariſe by taking the greateſt power as often as there are terms. His demonſtrations, and ſome of his expreſſions, (as when he ſpeaks of quantities more than infinite) have been excepted againſt; however, it muſt be owned, this valuable treatiſe contributed to produce the great improvements which ſoon after followed.

But Sir Iſaac Newton has accompliſhed what Cavalerius wiſhed for, by inventing the method of fluxions, and propoſing it in a way that admits of ſtrict demonſtration, which requires the ſuppoſition of no quantities, but ſuch as are finite, and eaſily conceived; by his doctrine of prime and ultimate ratios, he has found out the proper medium, whereby to avoid the impoſſible notion of indiviſibles on the one hand, and the length of exhauſtions on the other. The computations in this method, are the ſame as in the method of infiniteſimals, but it is founded on accurate principles, agreeable to the ancient geometry; in it the premiſes and concluſions are equally accurate, no quantities are rejected as infinitely ſmall, and no part of a curve is ſuppoſed to coincide with a right line: but as the explication of their nature and uſe has employed ſome of our greateſt mathematicians to write expreſs treatiſes thereon; and as the invention can never be ſufficiently applauded, we will conclude with Mr. Ditton, that the next improvement muſt be the ſcience of pure intelligences.

GEORGE, or *Knights of St.* GEORGE, has been the denomination of ſeveral military orders, whereof that of the garter is one of the moſt illuſtrious. See the article GARTER.

Croſs of St. GEORGE, a red one in a field argent, which makes part of the Britiſh ſtandard. See CROSS and GARTER.

GEORGIAN MONKS and NUNS, religious of Georgia, in Aſia, who follow the rule of St. Baſil. See the article BASIL.

GEORGIC, a poetical compoſition upon the ſubject of huſbandry, containing rules therein, put into a pleaſing dreſs; and ſet off with all the beauties and embelliſhments of poetry.

GERANITES, in natural hiſtory, an appellation given to ſuch of the ſemipellucid gems, as are marked with a ſpot reſembling a crane's eye.

GERANIUM, crane's-bill, in botany, an extenſive genus of plants; the flower hath a perſiſtent pentaphyllous cup, the corolla is compoſed of five oval heart-ſhaped ſpreading petals, equal in ſome ſpecies and unequal in others; the ſtamina are ten awl-ſhaped filaments, alternately longer, but are all ſhorter than the corolla; theſe are terminated with oblong anthera; the piſtil is a quinquangular roſtrated germen, ſupporting a perſiſtent ſubulated ſtyle, which is longer than the ſtamina, and crowned with five reflexed ſtigmas; it hath no pericarpium, but the flower is ſucceeded by five ſeeds, which are twiſted together at their extremities ſo as to reſemble the beak of a ſtork or crane, whence the Engliſh name crane's bill.

There are ſeveral ſpecies of geranium which grow naturally in England, ſome of which are eſteemed the greateſt vegetable vulneraries and aſtringents in the world, particularly in ſtopping hæmorrhages, and diſſolving coagulated blood.

Among the curious in plants, the African geraniums are much noticed for their foliage and beautiful flowers; they require to be ſheltered from the froſt in winter, and may be propagated from ſeeds, or (if of the ſhrubby kind) more expeditiouſly by cuttings, which may be taken off in the ſummer months and planted in the ſhade, when in ſix weeks time they will be fit for potting, and when the froſts begin to come in autumn, ſhould be placed in a green-houſe, in order to preſerve them.

GERARDIA, in botany, a genus of plants whoſe flower conſiſts of a monopetalous ringent corolla

PLATE LVII

Facing Gerves's Engine

Gerves's Engine
Fig. 2.

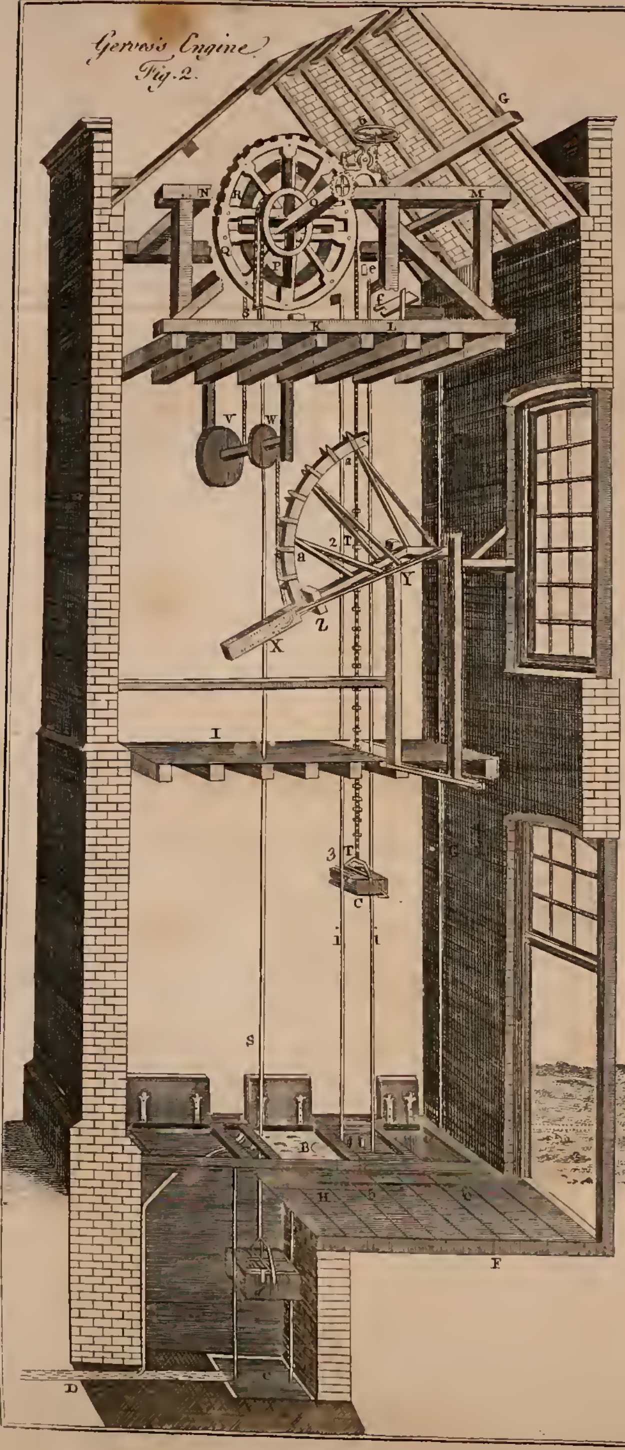
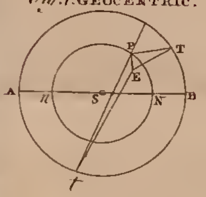
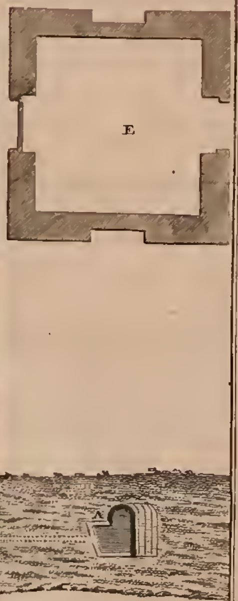


Fig. 1. GEOCENTRIC.





rolla, the tube is cylindrical and longer than the cup, the upper lip is erect, obtuſe, plain, and emarginated; the lower lip is reflexed, and divided into three ſegments; the fruit is an ovate, bilocular and bivalvular capſule, containing egg-ſhaped ſeeds.

GERM, among gardeners, the ſame with bud. See the article Bud.

GERMAN, in genealogy, denotes entire or whole; thus, a brother-german is one both by the father's and mother's ſide; and couſins-german are the children of brothers or ſiſters.

GERMANDER, in botany, the Engliſh name of the teucrium of Linnæus. See the article Teucrium.

Water-Germander, a plant called by botaniſts ſcordium. See Scordium.

GERMEN, or Germ, the ſame with bud. See the article Bud.

GERMINATION, the firſt ſprouting of the ſeeds of plants. See Vegetation.

GERUND, in grammar, a verbal noun of the neuter gender, partaking of the nature of a participle, declinable only in the ſingular number, through all the caſes except the vocative.

GESNERIA, in botany, a genus of plants the flower of which is monopetalous, tubular, and divided into five ſegments at the limb, containing four ſtamina, which are ſhorter than the corolla.

The fruit is a roundiſh capſule, filled with a very great number of ſmall ſeeds.

GESTATION, among phyſicians, the ſame with pregnancy. See the article Pregnancy.

GESTURE, in rhetoric, conſiſts chiefly in the proper action of the hands and face. It is a kind of natural language, that ſupplies the uſe of ſpeech in perſons born dumb. See the article Action.

GETHYLLIS, in botany, a genus of plants, the flower of which is monopetalous. The tube is filiform, and very long. The limb is plane, divided into ſix equal ſegments of a lanceolate figure, and about a third part the length of the tube. The ſtamina are twelve, and ſometimes eighteen filaments, topped with oblong antheræ.

The fruit is an oblong ventricoſe triangular capſule, with three cells, including a number of ſeeds.

GEUM, *Avens*, in botany, a genus of plants whoſe flower conſiſts of five roundiſh petals with narrow ungues the length of the cup, and inſerted into it. The ſtamina is compoſed of a great number of ſubulated filaments, topped with ſhort obtuſe antheræ. It is deſtitute of a percaripium; but the common receptacle of the ſeeds is oblong, hairy, and placed on the cup. The ſeeds are numerous compreſſed, hiſpid, and each furniſhed with a long geniculated ſtyle.

A ſpecies of geum, which grows naturally in many parts of England, is ſometimes uſed in medicine, and is eſteemed a cephalic and alexipharomic.

GIAGH, in chronology, a cycle of twelve years; in uſe among the Turks and Cathayans.

GIBBOUS, in aſtronomy, a term uſed in reference to the enlightened parts of the moon, whilſt ſhe is moving from the firſt quarter to the full, and from the full to the laſt quarter: for all that time the dark part appears horned, or falcated; and the light one hunched out, convex, or gibbous. See the article Moon.

GIFT, in law, a conveyance, by which either lands or goods are paſſed: it is of larger extent than a grant, being applied to things moveable and immoveable.

GIGG, or Jigg, in muſic, denotes a briſk and lively air; or an airy kind of dance, to a ſprightly meaſure.

GILBERTINES, a religious order founded in England by St. Gilbert, in the reign of Henry I. The nuns followed the rule of St. Benedict, and the monks that of St. Auguſtin. There were many monaſteries of this order in different parts of England.

GILDING, the art of ſpreading or covering a thing with gold, either in leaf or liquid. See the article Gold.

We have this advantage over the ancients, in the manner of uſing and applying the gold, that the ſecret of painting in oil, lately diſcovered, furniſhes us with means of gilding works, capable of enduring all the violences of time and weather, which theirs could not.

GILL, a meaſure of capacity, containing a quarter of a pint.

Gill is alſo a name for ground-ivy, which, being infuſed in ale, makes what is known by the name of gill-ale; a ſort of medicated ale, ſaid to be abſterſive and vulnerary.

GIN, or Geneva, among diſtillers. See the article Geneva.

Gin, in mechanics, a machine for raiſing great weights, fitted with a windlaſs and winches at each end, where eight or nine men heave, and round which a rope is reeved, that goes over a pulley at the top; and the whole ſupported by three feet, forming a triangle.

GINGER, in botany. See the article Amomum.

Ginger-Bread, a richer kind of bread, the flavour and taſte whereof are heightened and improved with ſpices, and particularly with ginger, whence the name.

GINGIVÆ, the gums, in anatomy, a hard ſort of fleſh, inveſting the alveoli, or ſockets of the teeth.

The gums conſiſts of the common membrane of the mouth, and the perioſteum of the jaws, to which they adhere very cloſely and firmly. They are furniſhed with a vaſt number of blood-veſſels, whence their florid red colour; and they ſerve for the covering of the jaws, and the keeping the teeth faſt in their ſockets.

GINGLYMUS, γιγγλυμος, one of the three ſubdiviſions of that kind of articulation called diarthroſis. See the articles ARTICULATION and DIARTHROSIS.

GINORA, in botany, a genus of plants whoſe flower conſiſts of a monophyllous cup, with ſix roundiſh patent petals, and ten awl-ſhaped filaments, topped with reniform antheræ.

The fruit is a roundiſh depreſſed capſule, with one cell, and four valves, and contains a number of minute ſeeds.

GINSENG, *Panax*, in botany, its characters are, it hath a fleſhy taper root, which is jointed, and grows to about four or five inches long, of the thickneſs of a finger, with a few fibres proceeding from it. The ſtalk riſes near four feet high, where it generally divides into three ſmaller foot-ſtalks, each ſuſtaining a leaf compoſed of five ſerrated, ſpear-ſhaped lobes, of a pale green, and a little hairy. The flowers ariſe on a ſlender foot-ſtalk, and are formed into a ſmall umbel. They are of an herbaceous yellow colour, each compoſed of five petals, and are ſucceeded by compreſſed heart-ſhaped berries, which contain two hard compreſſed cordated ſeeds.

Ginſeng was thought only to grow in China and Tartary; but it is now found in Maryland, and other parts near it, from whence it is brought to London, and exported to the Eaſt-Indies, where it bears a conſiderable price.

The roots of ginſeng and ninzin are ſo much alike in their ſhape, colours, and virtues, that they are frequently miſtaken for one another, and thought by the generality of authors to be the ſame. They are certainly of the ſame genus; and if there is any difference, it can only be ſpecific.

The Chineſe and Tartars collect the root of this plant with infinite pains, at two ſeaſons of the year, ſpring and autumn. They are forbid to touch them with any iron inſtrument, ſo that they can only clean them with wooden knives. They waſh them in a decoction of millet-ſeed, and afterwards hang them over the fumes of the ſame liquor, which they boil in conſiderable quantities for that purpoſe, in a cloſe veſſel, in the upper part of which the root is ſuſpended, over the ſurface of the liquor: after this they dry it for uſe, thus it becomes tranſparent. The ſmall fibres which are taken off, they boil in water, and make an extract of them, which they uſe in the ſame intention with the root.

The Chineſe value the ginſeng ſo highly, that it ſells with them for three times its weight in ſilver. They, as well as the Aſiatics in general, think the ginſeng almoſt an univerſal medicine: they have recourſe to it in all diſeaſes, as the laſt remedy, and readily give themſelves over when it will not cure them; but the virtues moſt generally aſcribed to it, are thoſe of a reſtorative, a provocative, and a cordial. It is famous in the eaſt for giving ſtrength to thoſe who have diſabled themſelves by the too free uſe of women: there they alſo recommend it greatly in the ſmall-pox, fevers of all kinds, diſorders of the the ſtomach and bowels, and tell us that diarrhœas and dyſenteries are cured by it: but they caution people not to give it in too large doſes to perſons of a florid ſanguine conſtitution, on whatever occaſion it may be neceſſary to them. The European phyſicians eſteem it a good medicine in convulſions, vertigoes, and all nervous complaints, and recommend it as one of the beſt reſtoratives known.

Its doſe is from ten grains to twenty, in powder; and from one dram to two to the pint, in infuſions.

GIRANDOLE, a kind of branched candleſtick.

GIRDERS, in architecture, ſome of the largeſt pieces of timber in a floor.

Their ends are uſually faſtened into ſummers and breaſt-ſummers, and joiſts are framed in at one end to the girders.

Chriſtians of the GIRDLE, the Chriſtians of Aſia, particularly thoſe of Syria and Meſopotamia, who to this day wear a large leathern girdle, being enjoined thereto by Motavakkel, tenth caliph of the family of the Abaſſides, in the year 856, as a badge of their profeſſion.

Order of the GIRDLE. See CORDELIER.

GIRDLE, in architecture. See CINCTURE.

GIRKIN, a term uſed by gardeners for a ſmall kind of cucumber.

GIRONNE, or GIRONNY, in heraldry, a coat of arms divided into girons, or triangular figures, meeting in the center of the ſhield, and alternately colour and metal.

GIRT, in the menſuration of timber, denotes the circumference of a tree. See the article TIMBER.

GIRT, in the ſea language, the ſituation of a ſhip riding at anchor with two cables, which are drawn ſo extremely tight by mechanical powers, as to prevent the ſhip from turning or veering round on the change of the wind or tide, one of the cables bearing ſtrongly againſt her keel: in this poſition ſhe muſt ride with her broad-ſide or ſtern to the wind and tide, till one or both of the cables are ſlackened ſo as to ſink under the keel, that the ſhip may not be retarded in her motion.

GISON, or GEISON, in Jewiſh antiquity, ſignifies, according to Joſephus, a little wall, about breaſt high, made round the temple of Jeruſalem, and round the altar of burnt-ſacrifices, to keep the people at a diſtance. This author, in his books of Antiquities, makes the giſon three cubits high, and but one in his hiſtory of the Jewiſh war.

PLATE LVIII. Facing Glaſs.

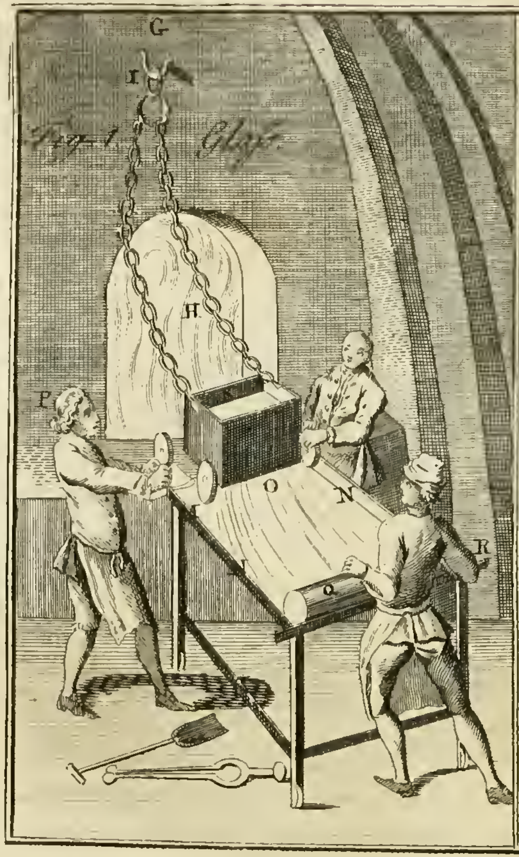


Fig. 1 Glaſs

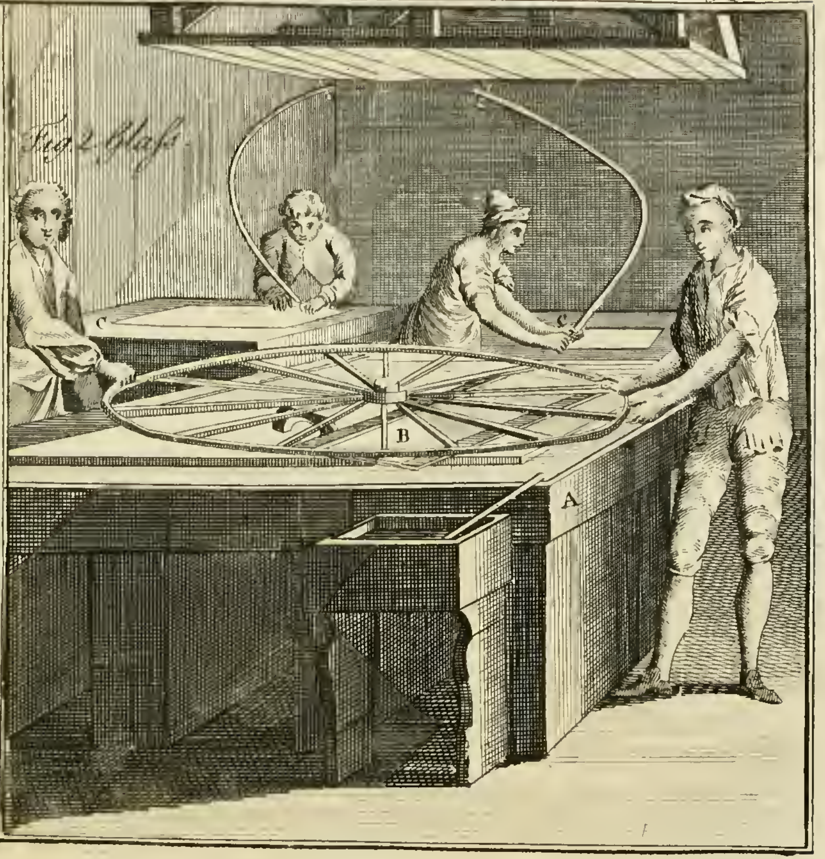


Fig. 2 Glaſs

GIVEN, among mathematicians and philoſophers, the ſame with data. See the article DATA.

GLACIS, in building, an eaſy, inſenſible ſlope, or declivity.

The deſcent of the glacis is leſs ſteep than that of the talus. In gardening, a deſcent ſometimes begins in talus, and ends in glacis. See the article TALUS.

The glacis of the corniche is an eaſy imperceptible ſlope in the cymatium, to promote the deſcent and draining off the rain-water.

GLACIS, in fortification, that maſs of earth which ſerves as a parapet to the covered way, ſloping eaſily towards the champaign, or field.

The glacis, otherwiſe called eſplanade, is about ſix feet high, and loſes itſelf by an inſenſible diminution in the ſpace of ten fathoms. See ESPLANADE.

GLADE, in gardening, an opening through a wood, &c. ſo as to admit a paſſage.

This is formed by lopping off thoſe branches which would otherwiſe obſtruct the way.

GLADIOLUS, *Cornflag*, in botany, a genus of triandrious plants, the flower of which conſiſts of ſix oblong, obtuſe petals, which join at their baſes.

The fruit is an oblong, ventricoſe, three-cornered capſule, with three valves, and three cells, containing a number of roundiſh ſeeds.

The root of the gladiole, or common corn-flag, is accounted diſcutient, and good in malignant and peſtilential caſes.

GLADIATORS, in antiquity, perſons who fought generally in the arena at Rome, for the entertainment of the people.

GLAND, in anatomy, a ſmall body, formed by the interweaving of veſſels of every kind, covered with a membrane, uſually provided with an excretory duct, and deſtined to ſeparate ſome particular fluid from the maſs of blood, or to perfect the lymph. See BLOOD and LYMPH.

GLANDERS, in the manege, a diſeaſe in horſes, conſiſting of a thick, ſlimy, corrupt humour, running from the noſtrils, of a different colour, according to the different degrees of malignity, or as the infection has been of a ſhorter or longer continuance; being white, yellow, green, black, or bloody.

Authors aſcribe this diſeaſe to various cauſes: ſome to infection; others, to a diſorder of the lungs; others, to the ſpleen; ſome to the liver; and others, to the brain. After it has been of ſo long a ſtanding, as that the matter is become of a blackiſh colour, which is uſually in its laſt ſtage, they ſuppoſe it to come from the ſpine; and hence they call it the mourning of the chine.

Kernels and knots are uſually found under the caul in this diſorder; and as theſe grow bigger and more inflamed, ſo the glanders increaſe more.

For the cure of the glanders Mortimer gives the following receipt.

Take a pint of chamber lye; two ounces of oil of turpentine; half a pint of vinegar; four ounces of flower of brimſtone; half a handful of rice; boil this compoſition till it comes to a pint, and give it to the horſe faſting; and let him faſt after it ſix hours from meat, and twelve from water.

GLANDULAR, or GLANDULOUS, among anatomiſts, ſomething abounding with, or partaking of the nature of, glands.

GLANDULE, or GLANDULA, a term uſed by anatomiſts to expreſs a ſmall gland. See GLAND.

GLANDULOUS ROOTS, among botaniſts, ſignifies ſuch tuberous ones as are connected together by ſmall fibres, ſuch are dropwort, potatoes, &c.

GLANS, in anatomy, the anterior extremity of the penis, called by other different names, as the head of the penis, the nut of the penis, and the balanus of the penis. See the article PENIS.

GLANS is alſo uſed to denote the tip or extremity of the clitoris, from its reſemblance both in form and uſe to that of the penis. The principal difference conſiſts in this, that it is not perforated as is the glands of the penis.

GLASS, a kind of factitious, brittle, and tranſparent body, produced by the action of fire upon a fixed ſalt and ſand that readily melts.

Venice, for many years, excelled all Europe in the fineneſs of its glaſſes; but lately the French and Engliſh have excelled the Venetians; ſo that we are no longer ſupplied from abroad.

The ſubſtances which have been employed in forming the body of glaſs are ſand, by which is only to be underſtood the white kinds, flints, talc, ſpar, and ſeveral other ſtony foſſils. All theſe vitrify of themſelves too ſlowly to produce perfect glaſs by the degree of heat that can be applied to them when in large maſſes; which makes them therefore require the addition of thoſe other kinds, whoſe fluxing power may remedy this defect in them; while they on the other hand, being of low price, and to be procured in unlimited quantities, and giving that hardneſs, ſtrength, and inſolubility, which cannot be had in any glaſs formed of other ſubſtances without them, are yet eſſential and indiſpenſibly neceſſary ingredients in all kinds of manufactured glaſs.

The ſubſtances which are uſed as fluxing ingredients in glaſs, are red lead, pearl-aſhes, nitre, ſea-ſalt, borax, arſenic, and wood-aſhes containing the calcined earth and lixiviate ſalts as produced by incineration. The preſence of ſome of theſe bodies is always equally neceſſary with that of thoſe which form the body in all the compoſitions of manufactured glaſs. But the uſe of them both, with reſpect to choice and proportion, is greatly varied in different works; even where the ſame kind of glaſs is intended to be produced; as the general nature of them has never been hitherto underſtood by the directors of ſuch works; and they have only implicitly followed the beſt receipts they could procure, carefully keeping them a ſecret, when they happened either by communication or their accidental diſcovery to be poſſeſſed of ſuch improvement, as gave them any advantages over their fellow operators.

The ſubſtances which have been applied as colorific matter in manufactured glaſs, are extremely numerous and various; as all the ſpecies of metals and ſemi-metals, with many other mineral and foſſile bodies, have been uſed for the producing ſome colour or other; and make a large field of ſpeculative and practical knowledge. The art of ſtaining glaſs, with all the variety of colours in the greateſt degree of force and brightneſs, is not however of ſo much importance commercially conſidered, as the knowing how to baniſh and exclude, with eaſe and certainty, the colours which of themſelves ariſe in moſt of the compoſitions for glaſs intended to be perfectly tranſparent and colourleſs: for this laſt purpoſe, nitre and magneſia are the principal ſubſtances employed in the manufactories of this country; and extremely well anſwer the end, though not without enhancing the expence of the glaſs by the uſe of the firſt; and in a ſmall degree injuring its tranſparency by that of the latter; as may be demonſtrated by principles that are unqueſtionable in themſelves, though wholly unknown to thoſe who are practically concerned in theſe matters.

From theſe three kind of ſubſtances duly combined together by commixture and adequate heat, or in ſome caſes from the two firſt only, all the ſorts of manufactured glaſs at preſent in uſe are formed. The general manner of doing which is to reduce thoſe kinds of bodies that are in groſſer maſſes, to powder; and then, all the ingredients being thoroughly well mixed together by grinding, and put into proper pots, to place them in a furnace where the heat is ſufficient to bring them to a due ſtate of fuſion, in which they are to be continued till the vitrification be completed.

Working or blowing of Window or Table GLASS. See the article BLOWING *of Glaſs*.

*Caſting or running of large Looking-*GLASS *Plates*. The furnace G (Plate LIX. *fig*. 1.) is of a very large dimenſion, environed with ſeveral ovens, or annealing furnaces, called carquaſſes, beſides others for making of frit, and calcining old pieces of glaſs. This furnace, before it is fit to run glaſs, coſts three thouſand five hundred pounds. It ſeldom laſts above three years, and even in that time it muſt be refitted every ſix months. It takes ſix months to rebuild it; and three months to refit it. The melting pots are as big as large hogſheads, and contain about 2000 weight of metal. If one of them burſts in the furnace, the loſs of the matter and time amounts to 250 l. The heat of this furnace is ſo intenſe, that a bar of iron laid at the mouth thereof becomes red-hot in leſs than half a minute. The materials in theſe pots are the ſame as deſcribed before; and A is the man breaking the frit for that purpoſe. When the furnace is red-hot, theſe materials are put in at three different times, becauſe that helps the fuſion; and in twenty-four hours they are vitrified, refined, ſettled, and fit for caſting. H is the bocca, or mouth of the furnace, K is the ciſtern that conveys the liquid glaſs it receives out of the melting-pots in the furnace to the caſting-table. Theſe ciſterns are filled in the furnace, and remain therein ſix hours after they are filled; and then are hooked out by the means of a large iron chain, guided by a pully marked I, and placed L, by two men P, P. This carriage has no middle piece; ſo that when it has brought the ciſtern to the caſting-table M, they ſlip off the bottom of the ciſtern, and out ruſhes a torrent of flaming matter O, upon the table: this matter is confined to certain dimenſions by the iron rules N, N, N, which are moveable, retain the fluid matter, and determine the width of the glaſs; while a man R, with the roller Q reſting on the edge of the iron rulers, reduceth it as it cools to an equal thickneſs, which is done in the ſpace of a minute. This table is ſupported on a wooden frame, with truſtles for the convenience of moving to the annealing furnace; into which, ſtrewed with ſand, the new plate is ſhoved, where it will harden in about ten days. After this the glaſs needs only be ground, poliſhed, and foliated for uſe.

Grinding and poliſhing of Plate GLASS. Glaſs is made tranſparent by fire, but it receives its luſtre by the ſkill and labour of the grinder and poliſher, the former of whom takes it rough out of the hands of the maker.

In order to grind plate-glaſs, they lay it horizontally upon a flat ſtone table (*fig*. 2.) made of a very fine grained free-ſtone; and for its greater ſecurity they plaſter it down with lime, or ſtucco; for otherwiſe the force of the workmen, or the motion of the wheel, with which they grind it, would move it about.

This ſtone-table is ſupported by a ſtrong frame, A, made of wood, with a ledge quite round its edges, riſing about two inches higher than the glaſs. Upon this glaſs to be ground is laid another rough glaſs not above half ſo big, and ſo looſe as to ſlide upon it; but cemented to a wooden plank, to guard it from injury it muſt otherwiſe receive from the ſcraping of the wheel, to which this plank is faſtened; and from the weights laid upon it, to promote the grinding or friture of the glaſſes. The whole is covered with a wheel, B, made of hard light wood, about ſix inches in diameter; by pulling off which backwards and forwards alternately, and ſometimes turning it round, the workmen who always ſtand oppoſite to each other, produce a conſtant attrition between the two glaſſes, and bring them to what degree of ſmoothneſs they pleaſe, by firſt pouring in water and coarſe ſand; after that a finer ſort of ſand as the work advanceth, till at laſt they muſt pour in the powder of ſmalt. As the upper or incumbent glaſs poliſhes, and grows ſmoother, it muſt be taken away, and another from time to time put in its place.

This engine is called a mill by the artiſts, and is uſed only in the largeſt ſize glaſſes; for in the grinding of the leſſer glaſſes, they are content to work without a wheel, and to have only four wooden handles faſtened to the four corners of the ſtone, which loads the upper plank, by which they work it about.

When the grinder has done his part, who finds it very difficult to bring the glaſs to an exact plainneſs, it is turned over to the care of the poliſher, who with the fine powder of Tripoli-ſtone, or emery, brings it to a perfect evenneſs and luſtre. The inſtrument made uſe of in this branch, is a board, *c*, *c*, furniſhed with a felt, and a ſmall roller, which the workman moves by means of a double handle at both ends. The artiſt in working this roller is aſſiſted with a wooden hoop, or ſpring, to the end of which it is fixed; for the ſpring, by conſtantly bringing the roller back to the ſame points, facilitates the action of the workman's arm.

GLASS *of Lead*, a glaſs made with the addition of a large quantity of lead; of great uſe in the art of making counterfeit gems.

Log-GLASSES, in the marine, glaſſes that run a half minute and quarter-minute, to meaſure the ſhip's way at the time of heaving the log. See this operation fully explained under the article LOG.

Watch GLASSES, certain glaſſes to meaſure and divide the watches at ſea; they are of four and two hours, and of half an hour. See the article WATCH.

GLASS-WORT. See the article SALSOLA.

GLASTENBURY-THORN, a ſpecies of Meſpilus. It differs from the common hawthorn, of which it is only a variety, by its flowering twice a year; that is, in May or June, the ſeaſon the other bloſſoms, and in November, December, or January, according to the mildneſs of the ſeaſon. But as to the ſtory of its blowing particularly on Chriſtmas-day, it is a meer fiction, and deſerves not the leaſt credit.

GLAUBER'S SALT, a cathartic or purging ſalt, thus made. Take of the cake that remains after the diſtillation of Glauber's ſpirit of ſea-ſalt; diſſolve it in hot water, and filtre the ſolution through paper: then reduce the ſalt into cryſtals. It is given in doſes from half an ounce to an ounce.

GLAUCOMA, in ſurgery, a diſeaſe of the eye, wherein the cryſtalline humour is turned of a bluiſh or greeniſh colour, and its tranſparency thereby impaired. See CATATACT.

GLAUX, *Milkwort*, or *black Salt-wort*, in botany, a genus of plants, the flower of which conſiſts of a ſingle companulated erect and premanent petal, divided into five roundiſh ſegments.

The fruit is a globoſe, acuminated, unilocular capſule formed of five valves, and contains five roundiſh ſeeds.

Glaux grows naturally upon the ſea-ſhore in moſt parts of England.

GLAZING, in pottery, a compoſition applied to veſſels of earth, &c. to render them more beautiful, and prevent fluids from penetrating them.

Black GLAZING is made of lead-aſhes, eighteen meaſures; iron-filings, three; copper-aſhes, three; and zaffer, two meaſures. This, when melted, will make a brown black; and, if you want it blacker, add more zaffer to it.

Blue GLAZING is thus prepared: take lead-aſhes, one pound; clear ſand or pebble, two pounds; ſalt, two pounds; white calcined tartar, one pound; Venice, or other glaſs, ſixteen pounds; and zaffer, half a pound; mix them well together, and melt them for ſeveral times, quenching them always in cold water. If you would have it fine and good, it will be proper to put the mixture into a glaſs furnace for a day or two.

Brown GLAZING is made of common glaſs and maganeſe, or brown ſtone, of each one part; and lead of glaſs twelve parts.

Fleſh-colour GLAZING is made of twelve parts of lead-aſhes, and one of white glaſs.

Gold-coloured GLAZING. — To make gold-coloured glazing, take of litharge three parts; of ſand or calcined flint, one part; pound and mix theſe very well together, then run them into a yellow glaſs with a ſtrong fire. Pound this glaſs and grind it into a ſubtile powder, which moiſten with a well ſaturated ſolution of ſilver, and make it into a paſte; which put into a crucible, and cover it with a cover. Give at firſt a gentle degree of fire, then increaſe it, and continue it till you have a glaſs, which will be green. Pound this glaſs again, and grind it to a fine powder; moiſten this powder with ſome beer, ſo that, by means of a hair pencil, you may apply it upon the veſſels, or any piece of earthen ware. The veſſels that are painted or covered over with this glazing, muſt be firſt well heated, then put under a muffle, and as ſoon as the glaſs runs, you muſt ſmoak them, and take out the veſſels. Mr. Heinſius of Peterſburgh, who ſent this receipt to the Royal Society, uſes the words *afflare debes fumum*, which is rendered ſmoak them, in the Tranſactions. Phil. Tranſ. N°. 466.

Green GLAZING, may be prepared of eight parts of litharge, eight parts of Venice glaſs, four parts of braſs duſt; or of ten parts of litharge, twelve of flint or pebble, and one of æs uſtum, or copper aſhes.

Iron-colour GLAZING is prepared of fifteen parts of lead aſhes, fourteen of white ſand, five of copper aſhes, one of manganeſe, one of zaffer, and one of iron filings.

Liver-coloured GLAZING is prepared of twelve parts of litharge, eight of ſalt, ſix of pebble or flint, and one of manganeſe.

Purple-brown GLAZING, conſiſts of lead aſhes, fifteen parts; clear ſand, eighteen parts; manganeſe, one part; white glaſs, fifteen meaſures; and one meaſure of zaffer.

Red GLAZING is made of antimony, two pounds; litharge, three; and ruſt of iron calcined, one; grind them to a fine powder.

Sea-green GLAZING is made of five pounds of lead aſhes, one pound of tin aſhes, three pounds of flint, three quarters of a pound of ſalt, half a pound of tartar, and half a pound of copper duſt.

White GLAZING. A fine white glazing for earthen ware is thus prepared: take two pounds of lead, and one of tin; calcine them to aſhes: of this take two parts, calcined flint or pebble, one part; and ſalt, one part; mix them well together, and melt them into a cake for uſe.

The white glazing for common ware is made of forty pounds of clear ſand, ſeventy-five pounds of litharge or lead aſhes, twenty-ſix pounds of pot-aſhes, and ten pounds of ſalt: theſe are three times melted into a cake, quenching it each time in clear cold water. Or it may be made of fifty pounds of clean ſand, ſeventy of lead aſhes, thirty of wood aſhes, and twelve of ſalt.

Yellow GLAZING is prepared of red-lead, three pints; antimony and tin, of each two pounds. Theſe muſt be melted into a cake, then ground fine; and this operation repeated ſeveral times. Or it may be made of fifteen parts of lead ore, three parts of litharge of ſilver, and fifteen parts of ſand.

Citron-yellow GLAZING is made of ſix parts of read-lead, ſeven parts of fine red brick-duſt, and two parts of antimony.

GLEBE, among miners, ſignifies a piece of earth, wherein is contained ſome mineral ore. See ORE.

GLEBE, in law, the land belonging to a pariſh church, beſides the tithes.

GLECHOMA, in botany. See *Ground* IVY.

GLEDITSIA, in botony, a genus of the polygamia diſecia claſs of plants producing male and hermaphrodite flowers in the ſame katkin, and female flowers on different plants: the pericarpium is a very large compreſſed broad legumen, with ſeveral tranſverſe partitions, containing in each diviſion a hard roundiſh ſeed covered with pulp.

GLEET, in medicine, the flux of a thin limpid humour from the urethra. See the article GONORRHOEA.

GLENE, γλήνη, in anatomy, a ſhallow cavity of any bone, which receives another bone in articulation. It alſo ſignifies the cavity or ſocket of the eye.

GLOBE, in the language of geometers, is a round ſolid body, formed by the rotation of a ſemicircle about its diameter, remaining fixed until it return to the place again from whence it began to move; whence that point which was before in the middle of the diameter, and was the center of the generating circle, becomes now the center of the globe itſelf, as being equally diſtant from every point in the generated ſurface.

The artificial ſpherical body, from the exact ſimilitude it has to our ball of earth, as has been proved from manifold obſervations, and particularly from the obſervations made of eclipſes, has been choſen by geographers, as the fitteſt and propereſt inſtrument to delineate upon its outward ſurface the external appearance of this our globe; ſo that the terreſtrial globe is an artificial repreſentation of this our terraqueous globe, upon whoſe convex ſuperficies the form of the habitable world is delineated, and all the parts of the earth and ſea are deſcribed in their natural form, order, diſtance, and ſituation. See plate LX. *fig.* 1.

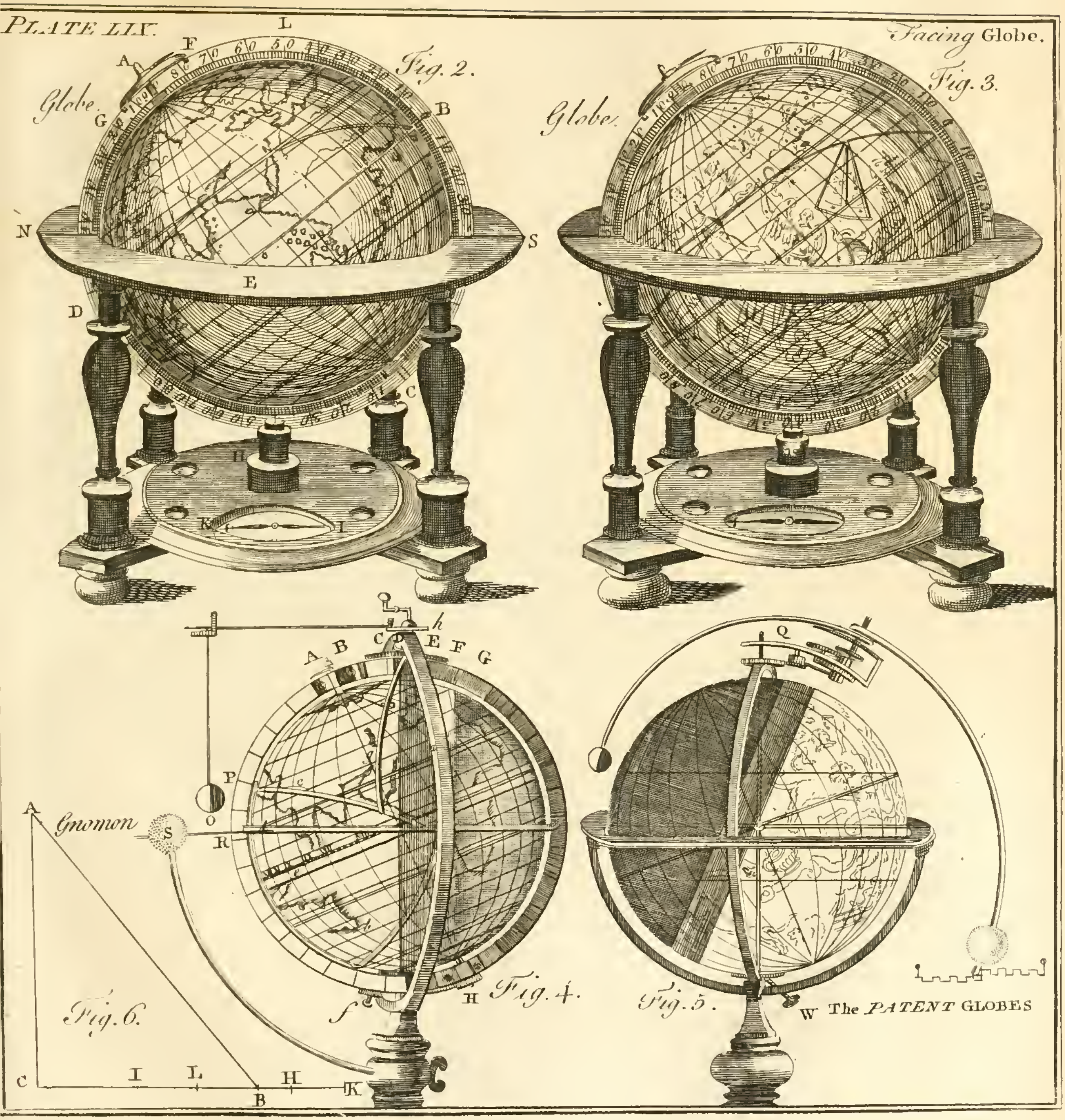
And becauſe the celeſtial bodies appear to us if they were all placed in the ſame concave ſphere, aſtronomers have likewiſe made uſe of the external ſurface of the globe to lay down the ſtars upon, in their juſt and due poſition and diſtance, and according to their ſeveral magnitudes. So that as the terreſtrial globe is an artificial repreſentation of the ſurface of this our terraqueous globe, as it would appear to us if placed at a convenient diſtance without it, and we could either be conveyed round it, or view it revolving about its own axis; ſo the celeſtial globe is alſo an artificial and lively repreſentation of the ſtarry heaven, ſuppoſing ourſelves placed in the center and the globe to be tranſparent, as it appears to us, when placed upon the convex ſurface of the earth; and which, conſidering its infinite ſmallneſs, with regard to the unmeaſurable diſtance of the fixed ſtars, may be conſidered as the center of the univerſe. See *fig.* 2.

And as the geographers, for the ready diſtinction of places, have divided the ſurface of the earth into ſeveral parts, ſuch as Europe, Aſia, &c. and theſe are divided again into empires, kingdoms, &c. ſo the aſtronomers, that they may the better diſtinguiſh the fixed ſtars from one another, have in like manner divided them into ſeveral aſteriſms or conſtellations, each of which contains a ſyſtem of ſeveral ſtars that are ſeen in the heavens near to one another; and have reduced theſe conſtellations into the forms of certain animals, ſuch as bulls, bears, lions, men, &c. or in the image of things known to us, as of a crown, a harp, &c. which were eſteemed by the ancients upon religious and civil accounts, and are ſtill retained by modern aſtronomers, to avoid that confuſion which would neceſſarily follow, in comparing their obſervations with thoſe that were formerly made.

And

PLATE LIX.

Facing Globe.



The *PATENT* GLOBES

And as the ancient aſtronomers for theſe reaſons very judiciouſly incloſed almoſt all the fixed ſtars that were known to them, in about forty-eight conſtellations, ſo their ſucceſſors, with equal right, when, by their diligent and frequent obſervations, they had greatly increaſed the number of ſtars in their catalogue, filled up moſt of the chaſms with new conſtellations of their own, and which are ſtill retained with great advantage to the obſervators.

Hence it appears, that globes are not only the moſt proper contrivances for accounting for all the heavenly appearances ariſing from the diurnal and annual motion of the ſun, or the rotation of the earth about her own axis: but the nobleſt inſtrument as well for informing the mind, and giving it the cleareſt and moſt diſtinct idea of the thing propoſed to be done, as for giving ſolutions to all problems reſulting from it; and it is from a contemplation of theſe bodies, and their ſeveral appendages, that aſtronomers have diſcovered ſo many excellent methods for the more eaſy and exact ſolution of the ſeveral aſtronomical and geographical propoſitions; whence it muſt be allowed, that to have a perfect knowledge of them, is one of the ſureſt and beſt foundations that can be laid by any one who would underſtand aſtronomy, geography, navigation, and their dependent ſciences.

Now, in order to lay down the places of the ſtars upon the globe, in their due ſituation and order, as well as to transfer the ſeveral diviſions of the earth, and to deſcribe on the terreſtrial globe the irregular terminations of land and ſea, it was abſolutely neceſſary to have ſome fixed or certain points, and conſequently lines, to begin to count or meaſure from; and this put mankind upon contriving thoſe ſeveral circles that are deſcribed upon the ſurface of the globes, which have their names given to them, ſome according to the uſes for which they are deſigned, and others upon the account of thoſe places that they are ſuppoſed to poſſeſs; which circles the reader ought to be very well acquainted with, and of which he will meet with a full account under the article SPHERE.

We ſhall therefore proceed to give an account of the ſeveral appurtenances belonging to the globes.

1. The horizon is that great broad circle that divides the globe into two equal equal parts, termed the upper and lower hemiſpheres.

This circle is diſtinguiſhed into two kinds; the one is called the ſenſible or natural horizon, and is that circle which bounds the utmoſt proſpect of our ſight, when we view the heavens round from any part of the ſurface of the earth or ſea; the other is called the true or mathematical horizon, to which all aſtronomical calculations refer, and which obtains only in the mind, and ſuppoſes the eye to be placed in the very center of the earth, beholding half of the entire firmament at one view; which is repreſented by the uppermoſt ſurface of that broad wooden circle E (*fig.* 1.) upon the upper ſurface of the frame in which the globe is fixed, having two notches, the one in the north and the other in the ſouth part of it, for the brazen meridian to ſtand in.

And as the globe is made to ſlide up and down in theſe notches, this circle is of great uſe in determining the times of the riſing and ſetting of the ſun or ſtars, and their continuance above the horizon; in ſhewing us the reaſon of the increaſe and decreaſe of the length of the day and night, &c. in all places of the earth by inſpection. Upon this broad horizon are deſcribed ſeveral other ſmall circles:

The firſt or innermoſt contains the twelve ſigns of the zodiac, each ſign being equal to thirty degrees. In the ſecond they are diſtinguiſhed by their proper names, marks, or characters. The third contains the days and months of the year, with the times when the principal fixed feaſts or faſts are to be celebrated.

The outermoſt circle contains the points of the compaſs, with the names of the winds, as they are called by our ſeamen.

The next great circle B L D is the meridian, and is repreſented by the brazen frame or circle in which the globe is hung by the two wires which repreſent the two poles of the world, or the two extremities of the axis on which the globe hangs; within which it turns, dividing the globe in two equal parts, called the eaſtern and weſtern hemiſpheres, and from its being made of braſs is generally termed the brazen meridian. This circle is divided into four quadrants anſwering to 360 degrees, the entire circumference of every circle, two of which commence at the equator and increaſe towards each pole, in order to ſhew the declination of the ſun or ſtars on the celeſtial globe, and the latitude of places on the terreſtrial globe; and the other two 90 degrees commence at either pole, and increaſe towards the equator for the more eaſy and ready adjuſting of the globe to the latitude of any particular place; for as the globe hangs in the meridian, and this is made to ſlide eaſily through the notches made in the north and ſouth points of the horizon, it is very eaſy to elevate or depreſs either pole of the globe, ſo as that it ſhall ſtand at any particular elevation.

And as the globe is made to turn within this circle, upon the two extremities of the axis, called the poles, this brazen meridian may be made to repreſent the meridian of any place upon the terreſtrial globe, or a circle of right aſcenſion, to any point whatſoever upon the celeſtial globe, and is of great uſe in the ſolution of all problems relating to either globe.

The next great circle is the equinoctial, as it is called on the celeſtial globe, or the equator on the terreſtrial, and divides the globe into two equal parts, called the northern and ſouthern hemiſpheres; this circle is of uſe in determining the right aſcenſion of the ſun or ſtars on the celeſtial globe, and the longitudes of places on the terreſtrial.

The next great circle is the ecliptic, divided into twelve ſigns, and each ſign into thirty degrees, dividing the globe into two equal parts, called the northern and ſouthern hemiſpheres, with regard to the latitudes of the fixed ſtars and planets.

The ſun in his annual motion, according to Ptolemy, paſſes through the ecliptic, and if we add to it a broad ſpace of about eight degrees on each ſide, we ſhall have the zodiac, in which are the twelve aſteriſms, the moſt of which having the likeneſs of ſome living creature, was the occaſion of giving it this name; and becauſe the greateſt latitude of any of the planets never amounts to eight degrees, the motion of the moon, as well as of the reſt of the planets, will always be performed in this ſpace.

The quadrant of altitude is a narrow thin plate of pliable braſs, exactly anſwering to one fourth part of the meridian, and divided into 90 degrees, having a notch, nut, and ſcrew at one end, to faſten it to the zenith in the meridian; and being thus fixed and turned round upon a ſmall pivot, it ſupplied the place of an infinite number of vertical circles, and is very uſeful in determining the altitudes and azimuths of the celeſtial bodies, and in finding the times, &c.

The hour-circle is a flat ring of braſs A B, ſo contrived, that it may be taken off and fixed about either pole of the globe; and when it is ſo faſtened to the brazen meridian, the pole becomes its center, and to that end of the axis there is fixed an index, that turns round as the globe itſelf is turned round, and points out upon the horary circle the hour given or required; for this horary circle being a repreſentation of the equator, which is carried about in one day, upon its upper ſurface are inſcribed the twenty-four hours of the natural day, at equal diſtances from one another; the twelfth hour next towards the zenith repreſenting twelve at noon, and the other neareſt the nadir repreſenting twelve at night; and the hours on the eaſtern ſide repreſenting the morning hours, and thoſe on the weſtern ſide repreſenting the afternoon hours; each hour anſwering to, or correſponding with, fifteen degrees of the great equinoctial, and is placed there for no other reaſon, but to ſave the trouble of reducing the degrees of the equinoctial into time, and the contrary.

The ſemi-circle of poſition, which is rarely or ever affixed to the globe, is a narrow thin plate of braſs, exactly anſwering to one-half of the horizon, divided into 180 degrees, and uſually affixed to the north and ſouth ends of the horizon or meridian, and is of uſe in making out the cuſps of the twelve houſes, as they are uſually called, in meaſuring the diſtances between any two places upon the ſurface of the earth, or any two ſtars upon the celeſtial globe, and may ſerve for a double quadrant of altitude, &c. and, laſtly, if a mariner's compaſs, duly touched with a loadſtone, be fixed upon the pediment or wooden frame which contains the globe, or in ſome part of the broad wooden horizon, ſo that the true meridian of the compaſs may lie exactly parallel to the plane of the brazen meridian; the globes are prepared for any uſe to which they may be applied, and ready for the ſolutions of all problems that can be propoſed relating to them.

Patent GLOBES, thoſe with Mr. Neale's improvements, for which he obtained his majeſty's letters patent.

The terreſtrial globe, with theſe improvements, is repreſented in plate LX. *fig.* 3. the earth being ſuppoſed in that part of its orbit where the north pole A is at its neareſt approach to the ſun S, which accordingly by the index or ray S R, points to the tropic of Cancer; *b* is a moveable circle, which, ſet to the latitude of a given place, will cauſe the ſemi-circle *c* to point out the zenith of the ſaid place; *d* repreſents the ecliptic, *e* the equator, and *f* a ſcrew, by which the annual motion may be ſeparated from the diurnal; *g* is a ſemi-circle which always moves at 90 degrees diſtance from the moon, and thereby becomes the lunar horizon for the northern hemiſphere; *b* is an inclined plane on which the ſtem of the moon P O moves, thereby cauſing the moon itſelf to ſhew its ſeveral latitudes, nodes, &c. and by this plane moving the contrary way, in a little more than nineteen of the annual revolutions of the globe, is ſhewn the retrograde motion of the nodes.

This globe is mounted with the horizon *a* fixed vertically, and placed ſo as to move upon its own axis A H, whereby it repreſents the diurnal motion of the earth. Hence if the globe be turned round its own axis, by means of the winch at the top, the ray from the ſun will, in this ſituation, deſcribe the tropic of Cancer: the whole arctic circle will be taken into the enlightened hemiſphere, and that of the antarctic circle will be involved in darkneſs. Let us now ſuppoſe the globe turned thirty times about by the winch, the north pole will then be ſituated as at B, and the index from the ſun will point to the ſign Leo on the ecliptic *d*: after turning the globe thirty times more, the north pole will be removed to C, and the index advanced to Virgo; and in this manner may the phænomena of the earth's annual motion be traced through all the ſigns of the ecliptic and ſeaſons of the year; the index or pointer deſcribing a ſpiral line, which every day at noon, or turn of the globe, falls at the diſtance of about fifteen minutes from that of the preceding day. When the earth is ſo far advanced in its orbit, that the index S R points to the equator, the reaſon will appear very clear why the days and nights are then equal all the world over; for both poles are now ſeen in the horizon, which, being the boundary of light and darkneſs, biſects all the parallels of latitude, and cauſes an equal diſtribution of day and night thoughout the whole earth.

If the rotation of the globe be continued, the obſerver will ſee the north pole deſcend juſt as many degrees below the horizon, as the pointer has advanced ſouth of the equator; and when it is arrived at the tropic of Capricorn, all that part of the globe within the arctic circle will be involved in continual darkneſs, whilſt that within the antarctic circle enjoys uninterrupted day.

At the diſtance of 90 degrees from the moon, as has been already obſerved, is placed a ſemi-circle, which being fixed on the center of the moon's motion, always moves round with her; thereby ſhewing throughout her courſe, all thoſe countries in the northern hemiſphere, to which ſhe is at any particular time riſing, thoſe where ſhe is then ſetting, and thoſe to whom ſhe is then due ſouth; as alſo the exact difference of time between the riſing and ſetting of the ſun and moon.

The celeſtial globe (*fig.* 4.) is mounted not quite ſo differently from the common globes, as the terreſtrial one; its horizon being as uſual, and the globe moveable to the latitude of any country; only inſtead of thoſe upright pillars to ſupport the horizon, as in common ones, here ſemi-circles are fixed on the pedeſtal, and from the pole of the equator a motion is conveyed to the pole of the ecliptic; where two arms or indexes are placed, on which are fixed the artificial ſun and moon. Theſe, as the globe is turned about its axis by the winch W, keep their exact motions over the ſame, by means of the wheel-work at Q, in like manner as thoſe luminaries do in the heavens; ſo that being once ſet right by an ephemeris, they will remain ſo, and thereby ſhew the riſing and ſetting of thoſe luminaries, with the length of the day and night, together with the true cauſe of all the viciſſitudes of the ſeaſons; and how, notwithſtanding their apparent motion from eaſt to weſt, they really move from weſt to eaſt; the moon, in a very little more than twenty-nine days and a half; and the ſun, in a year. See EARTH, SUN, and MOON.

To the center of the ſun, two jointed ſtems are occaſionally ſcrewed on, and to theſe are fixed Mercury and Venus; which by the ſaid joints may be ſet to their proper ſtations, and thereby ſeveral entertaining problems may be ſolved.

From what has been ſaid it is evident, that the uſual problems on the common globes, and moſt of thoſe with the orrery, may be ſolved by theſe curious machines.

GLOBE *Amaranthus*, in botany. See the article GOMPHRENA.

GLOBE *Thiſtle*. See ECHINOPS.

GLOBULARIA, globe-daiſy, in botany, a genus of plants, producing floſculous flowers; each floret is formed of a ſingle petal, tubular at the baſe, and diveded into four ſegments at the limb; the univerſal corolla is nearly equal; it is deſtitute of a pericarpium, but the proper cup, which is connivent, includes the ſeed, which is ſingle and ovated.

GLOBULAR, in general, an appellation given to things of a roundiſh figure, like that of a globe.

GLOBULE, a diminitive of globe, frequently uſed by phyſicians in ſpeaking of the red ſpherical particles of the blood. See BLOOD.

GLORIA PATRI, among eccleſiaſtical writers. See DOXOLOGY.

GLORIOSA, ſuperb lilly, in botany, a genus of plants, the flower of which conſiſts of ſix oblongo-lanceolated, undulated, and very long petals, reflex nearly to the baſe; the fruit is an oval pellucid capſule, containing three cells, and numerous globoſe ſeeds, diſpoſed in a double ſeries.

GLOSS, in matters of literature, denotes an expoſition or explication of the text of any author, whether in the ſame language, or any other; in which ſenſe it differs little from commentary. See COMMENTARY,

GLOSS, among artificers, the luſtre or brightneſs ſet upon cloth, ſilk, and the like. See CLOTH, SILK, &c.

GLOSSARY, *Gloſſarium*, a ſort of dictionary, explaining the obſcure and antiquated terms in ſome old author; ſuch are Du Cange's Latin and Greek Gloſſaries, Spelman's Gloſſary, and Kennett's Gloſſary at the end of his Parochial Antiquities.

GLOSSOCOMON, in ſurgery, an inſtrument, or ſort of caſe, contrived by the ancient ſurgeons, for containing a fractured leg or thigh.

GLOSSOCOMON, in mechanics, the name by which Hiero calls a machine, compoſed of ſeveral dented wheels with pinions, and uſed for raiſing great weights.

GLOSSOPETRA, in natural hiſtory, a genus of extraneous foſſils, ſo called from their having been ſuppoſed the tongues of ſerpents turned to ſtone, though they are really the teeth of ſharks, and are daily found in the mouths of thoſe fiſhes, wherever taken.

GLOTTIS, in anatomy, the mouth or aperture of the larynx, through which the air aſcends and deſcends in reſpiring. It is of an elliptic figure, and furniſhed with cartilages and muſcles, by means of which it is occaſionally dilated or ſtraightened, ſo as to give that wonderful variety of notes, of which the voice is capable, in ſpeaking and ſinging. See the article LARYNX.

GLOW-WORM, the Engliſh name of an inſect, called by zoologiſts cicindela. See the article CICINDELA.

GLUE, among artificers, a tenacious viſcid matter, which ſerves as a cement to bind or connect things together.

Glues are of different kinds, according to the various uſes they are deſigned for, as the common glue, glove-glue, and parchment glue; whereof the two laſt are more properly called ſize. See SIZE.

The common or ſtrong glue is chiefly uſed by carpenters, joiners, cabinet-makers, &c. and the beſt kind is that made in England, in ſquare pieces of a ruddy brown colour; and, next to this, the Flanders glue. It is made of the ſkins of animals, as oxen, cows, calves, ſheep, &c. and the older the creature is, the better is the glue made of its hide. Indeed, whole ſkins are but rarely uſed for this purpoſe, but only the ſhavings, parings, or ſcraps of them; or the feet, ſinews, &c. That made of whole ſkins, however, is undoubtedly the beſt; as that made of ſinews is the very worſt.

The Method of making GLUE. In making glue of parings, they firſt ſteep them two or three days in water; then waſhing them well out, they boil them to the conſiſtence of a thick jelly; which they paſs, while hot, through ozier-baſkets, to ſeparate the impurities from it, and then let ſtand ſome time, to purify it further: when all the filth and ordures are ſettled to the bottom of the veſſel, they melt and boil it a ſecond time. They next pour it into flat frames or moulds, whence it is taken out pretty hard and ſolid, and cut into ſquare pieces or cakes. They afterwards dry it, in the wind, in a ſort of coarſe net; and at laſt ſtring it, to finiſh its drying. The glue made of ſinews, feet, &c. is managed after the ſame manner; only with this difference, that they bone and ſcour the feet, and do not lay them to ſteep

The beſt glue is that which is oldeſt; and the ſureſt way to try its goodneſs, is to lay a piece to ſteep three or four days, and if it ſwell conſiderably without melting, and when taken out reſumes its former drineſs, it is excellent.

A glue that will hold againſt fire or water, may be made thus: mix a handful of quick-lime with four ounces of linſeed-oil; boil them to a good thickneſs, then ſpread it on tin-plates in the ſhade, and it will become exceeding hard, but may be eaſily diſſolved over a fire, as glue, and will effect the buſineſs to admiration.

GLUME, *Gluma*, among botaniſts, a kind of cup commonly conſiſting of two or three membraneous valves, which are often pellucid. Barley, oats, reeds, &c. have this ſort of cup, calledhuſk, as likewiſe have all ſorts of graſſes.

GLUTÆUS, in anatomy, the name of three muſcles, which form the buttocks, and from their ſize are called maximus, medius, and minimus. They all ariſe in the external ſurface of the ilium, iſchim, and os ſacrum: the termination of the firſt, or greateſt, is about four fingers-breadth from the great trochanter, and the terminations of the two others are in this trochanter.

GLYCINE, a kidney-bean-tree, in botany, a genus of plants, whoſe flower is papilionaceous.

The fruit is an oblong pod, containing ſeveral kidney-ſhaped ſeeds.

GLYCONIAN VERSE, in ancient poetry, conſiſts of three feet, whereof the firſt is a ſpondee, the the ſecond a choriambus, and the laſt a pyrrhichius; or the firſt may be a ſpondee, and the other two dactyls.

GLYCYRRHIZA, liquorice, in botany, a genus of plants whoſe flower is papilionaceous. The vexillum is ovato-lanceolated long and erect. The alæ is oblong: and the carina is dipetalous and acute.

The fruit is an ovate or oblong compreſſed unilocular pod, including two or three reniform ſeeds.

For the medicinal virtues and propagation of liquorice. See the article LIQUORICE.

GLYPH, in ſculpture and architecture, denotes any canal or cavity, uſed as an ornament.

GLYSTER, or CLYSTER, among phyſicians. See CLYSTER.

GMELINA, in botany, a genus of plants whoſe flower is monopetalous and ringent, with a quadrifid border.

The fruit is an unilocular globoſe drupe, including a ſmooth, ovate, bilocular nut.

GNAPHALIUM, cudweed, in botany, a genus of plants whoſe flower is compounded of hermaphrodite and female florets. The hermaphrodite are funnel-ſhaped, and form the diſc. The female florets are placed on the verge. It hath no pericarpium; but the ſeeds, which are oblong, ſmall, and crowned with down, are contained in the calyx, which is perſiſtent and ſhining.

This genus includes the elichryſum of Tournefort, and the helicryſum of Vaillant.

Cudweed is eſteemed drying and aſtringent; and ſtands recommended in dyſenteries, hæmorrhages, and all ſtinds of fluxes.

GNAT, in zoology, an inſect of the fly-kind, called by authors culex. See CULEX.

GNIDIA, in botany, a genus of plants, the flower of which conſiſts of four plane ſeſſile petals inſerted in the cup, with eight erect ſetaceous filaments, topped with ſingle antheræ. The ſeed is ſingle and ovate, and retained in the bottom of the cup.

GNOME is often uſed in a ſynonymous ſenſe with apophthegm. See APOPHTHEGM.

GNOMES, *Gnomi*, certain inviſible people, who, according to the Cabbaliſts, inhabit the inner parts of the earth. They are ſuppoſed ſmall in ſtature, and the guardians of quarries, mines, &c. See the article CABBALISTS.

GNOMON, in dialling, is the ſtyle or pin of a dial, whoſe ſhadow ſerves to point out the hour.

The word is Greek, and derived from γνωμων, which imports ſomewhat that makes known; becauſe the ſtyle indicates the hour.

The gnomon of every dial is ſuppoſed to repreſent the axis of the world, and therefore the two ends, or extremities thereof, muſt anſwer to the north and ſouth poles.

Gnomon, in geometry. If a parallelogram be divided into four leſſer ones by two right lines drawn reſpectively parallel to the ſides thereof, and one of theſe parallelograms be retrenched, or taken away; the remaining three will form a gnomon.

Gnomon, in aſtronomy, a pillar, &c. erected to find meridian altitudes of the ſun and ſtars by its ſhadow.

The method of finding the ſun's meridian altitude by the help of a gnomon was much uſed by the ancients. It muſt be obſerved, that the greater the height of the ſun is, the ſhorter is the ſhadow of a gnomon, and the contrary. In making obſervations for determining the meridian altitudes of the ſun and ſtars, it was uſual to ſet down what proportion the length of the ſhadow bore to the height of the pillar; that is, the heighth of the pillar being divided into a certain number of equal parts, to ſay how many of theſe parts the length of the ſhadow amounted to at the equinoxes or ſolſtices. The moſt ancient obſervation of this kind, that we meet with, is that made by Pytheas, in the time of Alexander the Great, at Marſeilles, where he found the height of the gnomon was to the meridian ſhadow, at the ſummer ſolſtice, as $213\frac{1}{8}$ to 600; the ſame as Gaſſendus found it to be, by an obſervation made at the ſame place, almoſt 2000 years after, in the year 1636.

A very exact method whereby to obſerve the meridian altitude of the ſun is as follows.—Make a circular perforation in a braſs plate, to tranſmit enough of the ſun's rays to exhibit his image on the floor: fix this plate parallel to the horizon in a high place proper for obſervation: then let fall a plumb-line, whereby to meaſure the height of the perforation above the floor. Take care the floor be perfectly level, and exactly horizontal; and let it be whitened over, to exhibit the ſun more diſtinctly: draw a meridian line thereon, paſſing through the foot of the gnomon, that is, through the point where the center of the plumb-line marks the floor: note the extreme points of the ſun's diameter on the meridian line K and I (Plate LX. *fig.* 5.) and from each ſubtract a right-line equal to the ſemi-diameter of the aperture, viz. K H on one ſide, and L I on the other: then will H L be the image of the ſun's diameter, which, biſected in B, gives the point on which the rays fall from the center of the ſun.

Now having given the right-line A B, and the altitude of the gnomon, with the angle A, which is right; the angle A B G, or the apparent altitude of the ſun's center, is eaſily found: for aſſuming one of the given ſides A B for radius; A G will be the tangent of the oppoſite angle B. Then ſay, as one leg A B : is to the other A G : : ſo is the whole ſine : to the tangent of the angle B.

GNOMONICS, *Gnomonica*, the art of dialling, or of drawing ſun and moon dials, on any given plane. See the article Dial.

GNOSTICS, in church-hiſtory, chriſtian heretics ſo called, it being a name which almoſt all the ancient heretics affected to take, to expreſs that new knowledge and extraordinary light to which they made pretenſions; the word gnoſtic ſignifying a learned, or enlightened perſon.

St. Epiphanius aſcribes the origin of the Gnoſtics to Simon Magus, and ſays that they acknowledged two principles, a good and a bad. They ſuppoſed there were eight different heavens, each of which was governed by its particular prince: the prince of the ſeventh heaven, whom they named Sabaoth, created the heavens and the earth, and ſix heavens below him, and a great number of angels. In the eighth heaven they placed their Barbelo, or Barbero, whom they ſometimes called the father and ſometimes the mother of the univerſe. All the Gnoſtics diſtinguiſhed the creator of the univerſe from God, who made himſelf known to men by his Son, whom they acknowledged to be the Chriſt. They denied that the Word was made fleſh; and aſſerted that Jeſus Chriſt was not born of the Virgin Mary, that he had a body only in appearance, and that he did not ſuffer in reality. They neither believed a reſurrection, nor a judgment to come; but imagined that thoſe who had not been inſtructed in their maxims, would return into the world, and paſs into bodies of hogs and other of the like animals. They had ſeveral apocryphal books, as the Goſpel of St. Philip, the Revelations of Adam, the Goſpel of Perfection, &c.

GOAT, *Capra*, in zoology, a quadruped of the order of the pecora. See the article Capra.

Goat's-Beard, *Tragopogon*, in botany. See the article Tragopogon.

Goat's-Eye, *Ægias*, among ancient phyſicians. See Ægias.

Goat-Sucker, *Caprimulgus*, in ornithology, a ſpecies of hirundo. See Hirundo.

Goat's-Thorn, the ſame with tragacanth.

GOBELINS, a celebrated manufactury for tapeſtry, eſtabliſhed by Mr. Colbert, at Paris, in 1667. See Tapestry.

GOBONE, or Gobony, in heraldry, the ſame with componed. See Componed.

GOD, *Deus*, the Supreme Being, the firſt cauſe or creator of the univerſe, and the only true object of religious worſhip.

The Hebrews called him Jehovah; which name they never pronounced, but uſed inſtead of it the words Adonai, or Elohim.

God, ſays Sir Iſaac Newton, is a relative term, and has reſpect to ſervants. It denotes, indeed, an eternal, infinite, abſolutely perfect being: but ſuch a being without dominion, would not be God. The word God frequently ſignifies lord, but every lord is not God. The dominion of a ſpiritual being, or lord, conſtitutes God; true dominion, true God; the ſupreme, ſupreme; pretended, pretended. From ſuch true dominion it follows that the true God is living, intelligent, and powerful; and from his other perfections, that he is ſupreme, or ſupremely perfect. He is eternal and infinite, omnipotent and omniſcient; that is, he endures from eternity to eternity, and is preſent from infinity to infinity. He governs all things that exiſt, and knows all things that are to be known. He is not eternity or infinity, but eternal and infinite. He is not duration and ſpace, but he endures and is preſent: he endures always, and is preſent every where; and by exiſting always and every where, conſtitutes the very things we call duration and ſpace, eternity and infinity. He is omnipreſent, not only virtually, but ſubſtantially; for power without ſubſtance cannot ſubſiſt. All things are contained and move in him, but without any mutual paſſion, that is, he ſuffers nothing from the motions of bodies, nor do they undergo any reſiſtance from his omnipreſence.

With reſpect to Chriſtians it will be ſufficient to mention, that they were very early divided in opinion, with regard to the nature and eſſence of the Supreme Being; a great part worſhipping three perſons in the unity of the godhead, while others abſolutely rejected a trinity of perſons, and aſſerted the unity of the Divine nature, both with reſpect to perſon and ſubſtance.

GODDESS, a heathen deity of the female ſex.

GOD-FATHERS and **God-Mothers**, perſons who undertake to anſwer for the future conduct of infants at their baptiſm.

GOLD, *Aurum*, the ſol and rex metallorum of the chemiſts, is a yellow metal ſcarce at all elaſtic or ſonorous, very ſoft and flexible, the moſt ductile of all metallic bodies. Dr. Halley took one grain of gilt ſilver, of which only one forty-eighth part was gold: this grain was drawn into a wire two ells in length, which examined by a microſcope, appeared every where covered with the gold: a piece of the wire being put into aqua-fortis, the ſilver was eaten out, and a tube of gold remained, which notwithſtanding its extreme thinneſs, was ſtill opake.

Gold is of all natural bodies the moſt ponderous: hence it ſinks into quickſilver, whilſt all other ſubſtances, platina excepted, ſwim on the ſurface. It is upwards of nineteen times heavier than an equal bulk of water: a Paris cubic foot is reckoned to weigh 1368 pounds. From its greater denſity it becomes ſenſibly hotter than other bodies when laid with them in hot water.

Gold diſſolves in a mixture of the nitrous and marine acids, called, from its action on this rex metallorum, aqua-regia: either of theſe acids ſingly have no effect upon it; nor is it acted on by the vitriolic.

Gold-Wire, a cylindrical ingot of ſilver, ſuperficially gilt, or covered with gold at the fire, and afterwards drawn ſucceſſively through a great number of little, round holes, of a wire-drawing iron, each leſs than the other, till it be ſometimes no bigger than a hair of the head. See the article Wire.

Gold-Wire *flatted*, is the former wire flatted between two rollers of poliſhed ſteel, to fit it to be ſpun on a ſtick, or to be uſed flat, as it is without ſpinning, in certain ſtuffs, laces, embroideries, &c. See the article Stuff, &c.

Gold-Thread, or **Spun Gold**, is a flatted gold, wrapped or laid over a thread of ſilk, by twiſting it with a wheel and iron bobins.

Gold-Leaf, or **Beaten Gold**, is gold beaten with a hammer into exceeeing thin leaves, ſo that it is computed, that an ounce may be beaten into ſixteen hundred leaves, each three inches ſquare, in which ſtate it takes up more than 159052 times its former ſurface.

This gold they beat on a block of black marble, about a foot ſquare, and uſually raiſed three feet high: they make uſe of three ſorts of hammers, formed like mallets, of poliſhed iron: the firſt, which weighs three or four pounds, ſerves to chaſe, or drive: the ſecond, of eleven or twelve pounds, to cloſe; and the third, which weighs fourteen or fifteen pounds, to ſtretch and finiſh. They alſo make uſe of four moulds of different ſizes, viz. two of vellom, the ſmalleſt whereof conſiſts of forty or fifty leaves, and the larger of two hundred: the other two, conſiſting each of five hundred leaves, are made of bullocks guts well ſcoured, and prepared.

Method of preparing and beating Gold. They firſt melt a quantity of pure gold, and form it into an ingot: this they reduce, by forging, into a plate about the thickneſs of a ſheet of paper; which done, they cut the plate into little pieces about an inch ſquare, and lay them in the firſt or ſmalleſt mould to begin to ſtretch them: after they have been hammered here a while with the ſmalleſt hammer, they cut each of them into four, and put them into the ſecond mould, to be extended farther.

Upon taking them thence, they cut them again into four, and put them into the third mould, out of which they are taken, divided into four, as before, and laid in the laſt, or finiſhing mould, where they are beaten to the degree of thinneſs required.

The leaves thus finiſhed, they take them out of the mould, and diſpoſe them into little paper books, prepared with a little red bole for the gold to ſtick to; each of which ordinarily contains twenty-five gold leaves. There are two ſizes of theſe books; twenty-five leaves of the ſmalleſt only weigh five or ſix grains, and the ſame number of the largeſt, nine or ten grains.

It muſt be obſerved, that gold is beaten more or leſs, according to the kind or quality of the work it is intended for; that for the gold wire-drawers to gild their ingots, is left much thicker than that for gilding the frames of pictures, &c. withal. See Gilding.

Gold-Finch, in ornithology, the Engliſh name of a ſpecies of fringilla, with the wings variegated with black, yellow, and white.

Gold-Size. See the article Size.

Gold-Smith, or as ſome chooſe to expreſs it, ſilver-ſmith, an artiſt who makes veſſels, utenſils, and ornaments in gold and ſilver.

Shell-Gold, that uſed by the illuminers, and wherewithal we write gold letters. It is made of made of the pareings of leaf-gold, and even of the leaves themſelves, reduced into an impalpable powder, by grinding on a marble with honey. After leaving it to infuſe ſome time in aqua-fortis, they put it in ſhells, where it ſticks. To uſe it they dilute it with gum-water, or ſoap-water.

GOLDEN, ſomething that has relation to gold, or conſiſts of gold, is valuable, or the like; as,

Golden-Bull. See the article Bull.

Golden-Calf, in Jewiſh antiquity, a figure which the Iſraelites caſt in gold, and ſet up in the wilderneſs to worſhip during Moſes's abſence in the mount, and which that legiſlator, at his return, burnt, ground to powder, and mixed with the water the people were to drink of; as in Exod. xxxii.

Golden-Fleece, in the ancient mythology, the ſkin, or fleece, of the ram upon which Phryxus and Hella are ſuppoſed to have ſwam over the ſea to Colchis; which being ſacrificed to Jupiter, its fleece was hung upon a tree in the grove of Mars, guarded by two brazen-hoofed bulls, and a monſtrous dragon that never ſlept; but was at laſt taken and carried away by Jaſon, and the Argonauts.

Golden-Number, in chronology, a number ſhewing what year of the moon's cycle any given year is. See Cycle *of the Moon*.

Golden-Rule, in arithmetic, is alſo called the rule of three, and the rule of proportion. See Proportion and Rule of Three.

Golden-Rod, in botany. See the article Solidago.

Golden-Saxifrage. See the article Chrysoplenium.

GOLPS, in heraldry, are roundles of a purple tincture, called by the French *torteaux*, adding their peculiar colours.

GOMPHOSIS, γομφωσις, in anatomy, a ſpecies of articulation, wherein one bone is ſet in the other, like a nail or peg; as the teeth within the jaws.

GOMPHRENA, the purple everlaſting flower, in botany, a genus of plants, the flower of which is divided into five parts, and erect; the petals are ſubulated and permanent: the fruit is a thin, roundiſh cruſt, with one cell, in which are contained a ſingle, large, roundiſh ſeed, with an oblique end. It is a native of both Eaſt and Weſt-Indies; and the flower is uſually of a beautiful purple colour.

GONDOLA, a ſort of barge curiouſly ornamented, and navigated on the canals of Venice. See the article Barge.

GONORRHOEA, in medicine, an involuntary efflux of the ſeminal juices, and ſome other recrementitious matter.

A virulent gonorrhœa, or clap, proceeds from impure coition with an infected perſon.

This diſtemper begins, and makes its progreſs, in the following manner.

The patient, ſooner or later, according as the perſon with whom he has had converſation, was more or leſs infected, and according to his conſtitution, by which he may be more or leſs diſpoſed to receive the infection, is firſt ſeized with an unuſual pain in the genetals; and a kind of ſenſation like a rotation of his teſticles. Afterwards, if the prepuce conſtantly covers his glands, there appears an eruption, or puſtule, which, by its ſize, colour, and figure, reſembles a ſpot of the meaſles. Preſently after appears a weeping matter like ſemen, which daily changes colour, and becomes more purulent, and more yellow, till at length, if the diſorder be highly virulent, it aſſumes a greeniſh hue, or appears like a thin ſanious matter, mixed with blood. The puſtule at length becomes an ulcer, called a ſhanker.

Thoſe whoſe glans is uncovered, ſeldom have ſuch a puſtule, and are leſs liable to imbibe the infection. The running brings on a heat, or ſmarting in making water, which is moſt violent when it is over, for then it ſeems to burn the whole duct of the urethra,

Another ſymptom is the cordee, or contraction of the frænum, by which the penis is bent downwards. There is likewiſe, when the penis is erected, great pain, as if compreſſed tranſverſely with a ſtrong hand. This chiefly happens in the night, when the patient is warm in bed: ſometimes the urethra being eaten, and excoriated with long running of acrimonious pus, nature breeds a ſoft ſpungy fleſh, to ſupply the defect; which daily increaſing, forms caruncles, or carnoſities ſo far as to plug up the urinary paſſage, and ſtop up the urine. However, the little adjoining ulcers continue to pour forth a kind of an ichor. It alſo happens, through ſome violent motion, or the ill-timed uſe of aſtringents, that the ſanies, which ſhould be carried off by the gonorrhœa, is tranſlated to the ſcrotum, and cauſes one or both of the teſticles to ſwell, and inflame with intolerable pain: the running at the ſame time decreaſing, while the ſcalding of the urine is as great as ever.

To theſe ſymptoms may be added the phimoſis, and the paraphimoſis. There are alſo ſometimes watery bladders, called cryſtallines, and at length buboes of the glans in the groin. See PHIMOSIS, PARAPHIMOSIS, BUBO, and POX.

Women are not ſubject to ſuch a variety of ſymptoms as men; their chief complaint being a difficulty of urine, and a running; however, they are liable to ſhankers and venereal warts, as well within as on the outward parts of the labia pudendi; as alſo to buboes in the groin: as for the coarctation of the ſphincter vaginæ, purſing as it were the external orifice, this is not a phimoſis, though by ſome improperly ſo called.

This diſorder proceeding from an infection of a malignant gonorrhœa, or the lues venerea, is firſt conveyed to the genitals, and afterwards through the pores to the lymph, or ſeminal liquor; the due craſis and natural mixture of which it deſtroys, by inducing partly a cauſtic and corroding, and partly a putrid ſtate thereof; hence ariſe the pains, the heats, the tumours, the inflammations, and the exulcerations of the genitals: for at firſt the glans only is infected whilſt in coition, the poiſon inſinuating itſelf into the pores; after which, it ſoon proceeds to the glans of the urethra, then to the proſtatæ, and afterwards to the veſiculæ ſeminales.

Aſtruc, in the cure of this diſorder, directs the uſe of crude quickſilver, as in the common unction, to be rubbed upon the parts, as about the penis, eſpecially under the urethra, to the perinæum, and ſo up to the pubes and teſticles, by which the mercury, inſinuating itſelf through the pores into the lymphatic veſſels, is inſtantly conveyed into the glandules, and ſubdues the poiſon lodged therein, taking away all the ſymptoms without any diſturbance to the primæ viæ, the ſtomach and guts.

If there is no diſcharge from the penis of any virulent matter, it is called the gonorrhœa ſicca, or dry clap; the ſymptoms of which are a dyſury, or difficulty of making water, and after, from the increaſe of the inflammation and tumefaction, an iſchury, or total ſuppreſſion of urine.

In the cure of the dry clap, Aſtruc adviſes plentiful bleeding in the beginning, to take off the tenſion, and to abate the inflammation; as alſo emollient decoctions of mallows, linſeed, &c. in milk, to foment the parts: but perhaps it might be better to make a poultice of theſe ingredients, after Boerhaave's method, to lay to the parts affected; or, which is beſt of all, to uſe them one after the other.

Aſtruc adviſes alſo lenient clyſters, cooling emulſions, and ptiſans, with ſal prunella and anodynes, between whiles. During the continuance of the inflammation, no mercurials muſt be uſed, and if the ſymptoms increaſe, threatening an abſceſs in the perinæum, it is to be forwarded as much as poſſible, by ſuppurative poultices, and the matter diſcharged.

When the gonorrhœa has continued a long while, or long enough for the poiſonous matter to make its way into the blood; or by aſtringents given unſeaſonably it cannot make its exit; then the patient is infected with the pox.

The third ſpecies of this diſorder requires the very ſame treatment with the ſimple and virulent: but here the leaſt time muſt not be loſt; the affected part muſt be kept in a conſtant ſtate of laxity, by the moſt emollient applications; and the contageous matter muſt with all poſſible expedition be drawn out: for the whole cure depends upon the total diſcharge of the infectious matter, together with the pus, which it has introduced; and if this taſk is not performed, a pox is greatly to be apprehended. Wherefore, if this diſeaſe continues but for a little time, recourſe muſt be had to all the ſeverities of a ſalivation. For though ſalivating does not at all cure either of the two former kinds of gonorrhœa, this ſpecies of the diſeaſe, having its ſeat in the glandulæ Cowperianæ of the urethra, ſo that the pus diſcharges itſelf by their excretory duct into the urinary duct, is much more ſuſceptible of the power of mercury.

GOOD, in general, whatever is apt to cauſe or increaſe pleaſure, or diminiſh pain in us; or, which amounts to the ſame, whatever is able to procure, or preſerve to us the poſſeſſion of agreeable ſenſations, and remove thoſe of an oppoſite nature.

Metaphyſical GOOD, the ſame with perfection. See PERFECTION.

Moral GOOD, denotes the right conduct of the ſeveral ſenſes and paſſions, or their juſt proportion and accommodation to their reſpective objects and relations.

GOOD BEHAVIOUR, in law, an exact carriage and behaviour to the king and his people.

GOOGINGS, in ſhip-building, certain plates of iron bolted to the ſtern-poſt of a ſhip, to receive and keep ſteady the rudder.

There are four or five of them on the ſtern-poſt, having a large hole in each, into which certain ſpindles, called pintles, are introduced, upon which the rudder reſts, and turns as upon an axis. See the article RUDDER.

GOOSE, *Anſer*, in ornithology, a well-known bird of the anas-kind, with the back of a greyiſh brown colour, the belly and edges of the wing-feathers white.

GOOSEBERRY, *Groſſularia*, in botany, a genus of plants of the ſhrub kind; its characters are, it hath a woody root, the branches when full grown are of a dark purple colour, armed with ſharp thorns at the riſe of the leaves, which have ſhort pedicles, and are lacinated like thoſe of the currant or vine, but leſs; the flowers are like thoſe of the currant, with which Linnæus claſſes them, under the general names ribes, but as they differ much both in their appearance and alſo their fruit, which in this grow not in bunches, it may here be thought proper to ſeparate them as diſtinct genera. There are ſeveral ſorts of gooſeberries propagated in gardens, as the amber-gooſeberry, red hairy gooſeberry, large Dutch gooſeberry, green gooſeberry, red ſmooth gooſeberry, with ſome other varieties; they are all propagated by cuttings, ſuckers, or from ſeeds, though beſt from cuttings, which may be taken off in autumn or ſpring; they are managed much the ſame as the currant both in planting and pruning, excepting that the extremities are commonly left in pruning.

Gooſe-Neck, among ſailors, a ſort of hook fixed in the inner end of a boom, or pole, to extend the bottom of ſome of the ſails of a ſhip, particularly the main boom of a brig or ſloop, and the lower-ſtudding-ſail booms of ſhips and larger veſſels. See the article Boom.

The gooſe neck is hooked in a ring or eye-bolt of iron, and may be occaſionally unhooked at pleaſure.

Gooſe-Wings *of a Sail*, the clues, or lower corners, of a ſhip's main-ſail or fore-ſail, when the middle part is tied up or furled to the yard.

The gooſe-wings are only uſed in a great ſtorm to ſcud under, when the ſail at large, or even reefed, would be too much for the ſhip to carry at ſuch a time.

GOR-COCK, a bird, otherwiſe called a moor-cock. See Moor-Cock.

GORDIAN Knot, in antiquity, a knot made in the leathers or harneſs of the chariot of Gordias, king of Phrygia, ſo very intricate, that there was no finding where it began or ended.

The inhabitants had a tradition, that the oracle had declared, that he who untied this knot, ſhould be maſter of Aſia. Alexander having undertaken it, was unable to accompliſh it, when fearing leſt his not untying it ſhould be deemed an ill augury, and prove a check in the way of his conqueſts, he cut it aſunder with his ſword, and thus either accompliſhed or eluded the oracle.

GORE, in heraldry, one of the abatements, which, according to Guillim, denotes a coward. It is a figure conſiſting of two arch lines drawn one from the ſiniſter chief, and the other from the ſiniſter baſe, both meeting in an acute angle in the middle of the feſs point.

Gore, in law, ſignifies a narrow ſlip of ground.

GORGE, *Gula*, in architecture, the narroweſt part of the Tuſcan and Doric capitals, lying between the aſtragal, above the ſhaft of the pillar and the annulets. See Tuscan and Doric.

It is alſo uſed for a concave moulding, larger, but not ſo deep as a ſcotia, which ſerves for compartments, &c. See the article Compartment.

Gorge, in fortification, the entrance of the platform of any work.

In all the outworks, the gorge is the interval betwixt the wings on the ſide of the great ditch, as the gorge of a ravelin, half-moon, &c. Theſe, it is to be obſerved, are all deſtitute of parapets; becauſe, if there were any, the beſiegers, having taken poſſeſſion of the work, might uſe it to defend themſelves from the ſhot of the place; which is the reaſon that they are only fortified with palliſadoes, to prevent a ſurprize.

The gorge of a baſtion is nothing elſe but the prolongation of the curtins from their angle with the flanks, to the center of the baſtion where they meet. When the baſtion is flat, the gorge is a right line, which terminates the diſtance between the two flanks. See the articles Bastion and Fortification.

GORGED, in heraldry, the bearing of a crown, coronet, or the like, about the neck of a lion or ſwan, and in that caſe it is ſaid, the lion or cygnet is gorged with a ducal coronet, &c.

Gorged is alſo uſed when the gorge, or neck of a peacock, ſwan, or the like bird, is of a different colour or metal from the reſt.

Gorged, among farriers, &c. ſignifies the ſame as ſwelled; in which ſenſe they ſay, the legs of a horſe are gorged; the paſtern joint is gorged; you muſt walk him out to diſgorge his ſhoulder.

GORGERIN, in architecture, the ſame with gorge. See the article Gorge.

GORGONS, in antiquity, a warlike female nation of Lybia, in Africa, who had frequent quarrels with another nation of the ſame ſex, called Amazons.

GOSHAWK, the Engliſh name of a yellow-legged falcon, with a brown back, and a white variegated breaſt.

GOSPEL, the hiſtory of the life, actions, death, reſurrection, aſcenſion, and doctrine of Jeſus Chriſt.

This hiſtory is contained in the writings of St. Matthew, St. Mark, St. Luke, and St. John; who from thence are called evangeliſts. The Chriſtian church never acknowledged any more than theſe four goſpels as canonical; notwithſtanding which, ſeveral apocryphal goſpels are handed down to us, and others are entirely loſt.

GOSSYPIUM, cotton, in botany, a genus of plants whoſe flower conſiſts of five plane patent petals, growing together at their baſes, and vertically cordated; the ſtamina are numerous, and joined in a column, and the fruit is a roundiſh capſule containing four cells, which encloſes a number of oval ſeeds, ſurrounded with a downy matter called cotton. See the article COTTON.

GOTHIC, in general, whatever has any relation to the Goths: thus we ſay, Gothic cuſtoms, Gothic architecture, &c. See the article ARCHITECTURE.

Gothic architecture is far removed from the manner and proportions of the antique; having its ornaments wild and chimerical, and its profiles incorrect: however, it is frequently found very ſtrong, and appears very rich and pompous, as may be ſeen in ſeveral of our Engliſh cathedrals. This manner of building was, originally, very heavy and coarſe; but is ſince run into the oppoſite extreme, being ſlender, rich, and delicate to a fault. In the Gothic architecture we ſee high vaults raiſed on ſlender pillars; and every thing crowded with windows, roſes, croſſes, figures, &c.

GOVERNMENT, in general, is the polity of a ſtate, or an orderly power conſtituted for the public good.

GOVERNMENT is alſo a poſt or office which gives a perſon the power or right to govern or rule over a place, a city or province, either ſupremely or by deputation.

GOVERNMENT is alſo uſed for the city, country, or place to which the power of governing is extended.

GOVERNMENT, in grammer, a part of conſtruction uſually called regimen.

GOUGE, an inſtrument or tool uſed by divers artificers; being a ſort of round hollow chiſſel, for cutting holes, channels, grooves, &c. either in wood or ſtone. See JOINERY.

GOURD, *Cucurbita*, in botany. See the article CUCURBITA.

GOUT, *Arthritis*, in medicine, as defined by Boerhaave, a very painful diſeaſe, whoſe ſeat is in the joints and ligaments of the feet, and whoſe principal times of invaſion are the ſpring and autumn.

The curative intention, according to Wintringham, requires, firſt, that the primæ viæ be ſet free from a load of indigeſted crudities, and the viſcera be reſtored to their priſtine vigour; ſecondly, that the fluid ſtagnating in, and ſtuffing up the ſmaller veſſels, may be expelled the body, and a free paſſage through the contracted veſſels be reſtored.

The firſt intention may be anſwered by vomits and gentle cathartics repeated as occaſion requires; by bitters, aromatics, antiſcorbutic medicines; by alkaline fixed ſalts, taken in ſmall quantities for a long time; by aliments and drinks that are nouriſhing, light, eaſy of digeſtion, quickly aſſimilated, and taken in due quantity; by powerful exerciſe often repeated, and long continued; and eſpecially by riding in a dry, ſerene, pure air; by frictions; by motion of the affected parts; by going to ſleep at early hours.

The ſecond intention may be anſwered partly by the preceding, as well as by procuring gentle ſweats; by bathing in natural and artificial baths; by ſweating in a bagnio; or by the uſe of volatile ſalts, and copious drinking of attenuating liquors, actually hot, in the morning while in bed, in order to procure a ſweat; as alſo by mercurial purges, taking a large quantity of diluents after them; by frictions of the whole body, eſpecially the parts affected, with hot, dry, linen-cloths, till a redneſs appear; by cold baths, and the like.

To abate the exceſſive pain in the part affected, Boerhaave ſays, that if there be an abſolute neceſſity, opiates may be given internally, and the patient may drink plentifully of hot whey, or any other liquor of the like nature. Externally emollients and anodynes may be uſed, laid on pretty hot; or the part affected may be beat with nettles; or it may be anointed with terebinthinated balſam of ſulphur; or tow may be burnt thereon.

GOUT-WORT, in botany, a term ſometimes uſed for angelica. See ANGELICA.

GOUTY-LAND, among farmers, denotes a mooriſh, cold, and black ſoil, abounding with ſprings.

In Staffordſhire, this ſort of land is ordered much in the ſame manner as heathy land, only that it is uſually burnt deeper. It bears little but oats, white oats upon the gouty, and black oats upon the black cold land.

The turf of theſe grounds burnt, and carried upon rye or barley lands, is eſteemed a better improvement than dung. See the article HEATHY LAND.

GRACE, *Gratia*, among divines, ſignifies any unmerited gift which God beſtows on mankind.

Act of GRACE, an act of parliament for a general and free pardon, and for ſetting at liberty inſolvent debtors.

Days of GRACE, in commerce. See DAY.

GRACES, in heathen mythology, three goddeſſes, whoſe names were Aglia, Thalia, and Euphroſyne; that is, ſhining, flouriſhing, and gay; or, according to ſome authors, Paſithea, Euphroſyne, and Ægiale. Some make them the daughters of Jupiter and Eurynome, or Eunomia, the daughter of Oceanus; but the moſt common opinion is, that they were the daughters of Bacchus and Venus.

They are ſometimes repreſented dreſſed, but more frequently naked, to ſhew, perhaps, that whatever is truly graceful, is ſo in itſelf, without the aid of exterior ornaments. They preſided over mutual kindneſs and acknowledgement; beſtowed liberality, eloquence, and wiſdom, together with a good grace, gaiety of diſpoſition, and eaſineſs of manners.

GRACILIS, in anatomy, a muſcle of the leg, ſo called from its ſlenderneſs: it ariſes from the ſynchondroſis of the os pubis.

GRADATION, in general, the aſcending ſtep by ſtep, or in a regular and uniform manner.

GRADATION, in architecture, a flight of ſteps, particularly aſcending from the cloiſter to the choir in churches.

It alſo denotes an artful diſpoſition of ſeveral parts, as it were by ſteps and degrees, after the manner of an amphitheatre; ſo that thoſe placed before, are rather ſerviceable than the contrary, to thoſe behind.

GRADATION, in painting, a gradual and inſenſible change of colour, by the diminution of the teints and ſhades.

GRADATION, in rhetoric, the ſame with climax. See the article CLIMAX.

GRAFT, or GRAFF, in gardening, a cion or ſhoot of a tree inſerted into another, ſo as to make it yield fruit of the ſame nature with that of the tree from whence the graft was taken.

GRAFTING, or ENGRAFTING, is the taking a ſhoot from one tree, and inſerting it into another, in ſuch a manner, that both may unite and form one tree.

There are various methods of grafting; but the following will be ſufficient to explain the manner of performing the operation; which is done about the latter end of March, or the beginning of April:

The top of the ſtock is cut off in a ſmooth, ſtraight place; then the cion, or graft, is prepared by cutting it on one ſide from the joint, or ſeam, down ſlopewiſe, making the ſlope about an inch, or an inch and an half long; and obſerving it is bent ſo that the cion may ſtand nearly upright when it is fixed to the ſtock. At the top of the ſlope a ſhoulder is made, whereby it is to reſt on the crown of the ſtock. The whole ſlope muſt be plain and ſmooth, that it may lie even to the ſide of the ſtock. The length of the cion uſed here may be about four inches from the ſhoulder, for a ſtandard tree; but for a dwarf, or wall tree, it may be ſix inches. When the cion is prepared, the outſide of its ſloped end, from the ſhoulder downwards, is applied to the weſt, or ſouth-weſt ſide of the ſtock, and its length and breadth meaſured thereon; which done, the bark of the ſtock (but not any of its wood) is cut away to thoſe dimenſions, that the cut part of the cion may be fitted in as exactly as poſſible. In doing this, regard muſt be had to the bigneſs of the ſtock, and the thickneſs of its bark, in order to proproportion thereto the length and breadth of the cut part of the cion; otherwiſe the paſſages of the ſap in the ſtock and cion will not meet, and the cion will then of courſe periſh. When the cut part of the cion is exactly fitted to, and laid on that of the ſtock, they are bound together with woollen yarn, and covered with clay, an inch above and as far below the head of the ſtock; working it round the cion, till it become ſharp at top, that the rain may run down it.

Whip-GRAFTING, or *Tongue*-GRAFTING, is proper for ſmall ſtocks, from an inch diameter to a quarter of an inch, or even leſs. Mr. Worlidge, Mr. London, Mr. Miller, and others, ſpeak of it as the moſt effectual way of any, and that which is moſt in uſe, becauſe the cion covers the ſtock much ſooner in this method than in any other; for here the cion and ſtock muſt always be of the ſame thickneſs. There are three ways of performing it, and all of them may be practiſed ſomewhat later than either of the foregoing.

The firſt is, to ſlope the cion off a full inch, or more; then to do the ſame to the ſtock; and afterwards to tie the one to the other, with baſs or yarn, ſo as to join them cloſely at every part, but particularly at the rind; and then to cover the joint carefully with well-tempered clay. The baſs uſed for this, or for any other binding, ſhould be taken from a ſound mat, and be ſoaked in water for ſome hours, to increaſe its ſtrength, and render it the more pliable.

The ſecond way is, to make a ſhoulder in the graft, and, the head of the ſtock being cut off and ſmoothed, to join it.

The third method, which is an improvement of the laſt, is properly named tipping or tonguing. This is done by cutting the ſtock off ſlanting, as before, and leaving at its upper ſide a thin piece, or tongue, as it is called, of the wood, pared away like the lower end of a cion. The cion is then ſloped, and tongued, in the ſame manner as the ſtock, and a ſlit is made in each of them, downward in the ſtock, and upward in the graft, on the ſide oppoſite to the tongue, ſo that each may receive the tongue of the other. The cion is then joined to the ſtock, as cloſely as can be, particularly at the bark; a ligature is made round them with baſs or woollen yarn, and the engrafted part is well covered with clay or cement.

Root-GRAFTING, is a modern invention, the deſign of which is ſomewhat different from that of any of the former methods; this being for the propagation or multiplication of plants already fitted to produce their fruit.

To perform this, take a graft, or ſprig, of a young tree, which you intend to propagate, and a ſmall piece of the root of another tree of the ſame kind, or of a like genus, and whip-graft them together; obſerving that the butt-ends of the graft and root be well united, and that the rind of the root join cloſely to that of the graft. Theſe may, afterwards, be planted out at pleaſure, and the piece of root will collect the nutritive juices, and feed the graft, as the ſtock does the other way.

This method of propagation is very eaſy and expeditious; roots being more plentiful than ſtocks: by this means the pieces of roots of one crab-ſtock, for example, or of one apple-ſtock, will ſerve for twenty or thirty apple-grafts; and the like of other trees. It is alſo an excellent way for raiſing tender trees, which will hardly bear being grafted in the ſtock. Add, that trees thus grafted bear ſooner, and are more eaſily dwarfed, than any other way.

The only objection againſt this method is, that the young tree grows but ſlowly at firſt, which is occaſioned by the ſmallneſs of the root that feeds the graft; for in all trees the head muſt follow the increaſe of the roots, from whence it hath its nouriſhment.

Reiterated-Grafting, or Grafting *by a double*, or *triple Inciſion*, is a method mentioned by Agricola, whoſe work, though chimerical enough in many reſpects, contains, notwithſtanding, ſeveral good things. To perform this, firſt graft a good cion on a ſtock, and cut it away to one-half, or a third part; then fix to that remaining part of the cion, another graft, of a better kind; and to that a third; for the oftener the tree is grafted, the finer fruit it produces.

By this method, the author above-mentioned aſſures us, that he produced muſcat-pears, which were admirable; making, at firſt, uſe of a ſtock grafted with a pound-pear, on which he grafted a ſummer bon-chretien; and when the branch of this laſt had ſhot, he grafted on it a cion of a bergamo, which he alſo cut, and grafted on it a cion of a muſcat-pear.

Grafting *by Approach*, called alſo *Inarching*, and *Ablactation*, is uſed only when the tree intended to be grafted, and that from which the graft is to be taken, ſtand ſo near, or can be brought ſo near to each other that they may be joined together. The method of performing it is thus: The branch to be inarched is fitted to that part of the ſtock where it is to be joined; the rind, and part of the wood, of one ſide of that branch, is then pared away very ſmooth and even, for the length of three inches; and afterwards, the other branch, which is to ſerve for the ſtock to which the graft is to be united, is ſerved in the ſame manner, ſo that the two may join cloſely and equally together, that the ſap veſſels may meet. A little tongue is then cut upwards in the graft, and a ſlit is made in the ſtock, to receive it; ſo that when they are joined, the tongue prevents their ſlipping, and the graft is the more cloſely united to the ſtock. When they are thus placed exactly together, they muſt be tied with baſs, worſted, or ſome other ſoft thing; and the place of junction muſt be well covered over with grafting-clay, to prevent the air from drying the wound, and the wet from rotting the ſtock. A ſtake muſt alſo be fixed in the ground, and both the ſtock and the graft muſt be tied thereto, to prevent their being diſplaced by the wind. When they have remained in this ſtate four months, they will be ſufficiently united, and the graft may then be cut off from the mother tree; obſerving to ſlope it cloſe to the ſtock. It is of great ſervice to the graft then to lay a freſh coat of clay all round the grafted or jointed part. This operation ſhould be performed in April or May, that the graft may be perfectly united to the ſtock, before the enſuing winter.

This method was more practiſed formerly than at preſent, on orange-trees, jaſmines, &c. but as there are better ways to manage them, either by cuttings or inoculation, inarching is therefore little uſed, but on thoſe ſorts of plants which are of a firm contexture and ſlow growth, which will not take otherwiſe.

It may be remarked, that few trees will take on each other, unleſs they are of the ſame genus; for inſtance, a plumb cion will not take on a nut-tree, but an almond, peach, nectarine, or apricot cion, will take on a plumb ſtock, and *vice verſa*; as they are all of the ſame family, and are therefore properly claſſed together by Linnæus under the general name *prunus*, as they agree in their generical characters, by which they are diſtinguiſhed from all other trees; but many of theſe are very ſubject to emit large quantities of gum (if grafted by the afore-mentioned forms) from ſuch parts of the trees as are deeply cut and wounded, which in the tender kinds, as peaches and nectarines, are more common and hurtful; it is found by experience, as the ſafeſt method, to practiſe eſcutcheon-grafting, or, as it is more commonly called, inoculation. See the article Inoculation.

The walnut, fig, and mulberry, will alſo take by this method of grafting, though neither of them will ſucceed in any other way: but ſtill they, like all other trees thus managed, will remain weak, and ſtinted in their growth, beſides the ſhortening of their otherwiſe uſual time of duration.

All grafts, particularly of young cions, are ſubject to be injured by birds; but that may be prevented, by binding ſome ſmall buſhes about the tops of the ſtocks.

The binding of grafts ſhould be looſened when the cions have puſhed forth about an inch and an half, or two inches, for if it is continued longer, its too great tightneſs will hinder the ſwelling of the ſtock, ſo as to hazard the cion being broke by the winds at the place of bandage: as a ſubſtitute in this caſe, if the cion is ſo ordered in cutting, that an eye be left againſt the place of junction, between the ſtock and graft, there is a probility of the bud putting forth after the damage has ſo happened, provided it is broke off above it, and thereby a year is gained.

GRAIN, a general name for all ſorts of corn, as wheat, barley, &c.

Grain, is alſo the name of a ſmall weight, the twentieth part of a ſcruple in apothecaries weight, and the twenty-fourth of a penny-weight troy. See the article Weight.

Grain alſo denotes the component particles of ſtones and metals, the veins of wood, &c. Hence croſs-grained, or againſt the grain, is contrary to the fibres of wood, &c.

GRAINING-BOARD, among curriers, an inſtrument (called alſo a pummel) uſed to give a grain to their leather. See the article CURRYING.

GRAMEN, graſs, in botany. See the article GRASS.

GRAMEN JUNCEUM, a name uſed by Moriſon for a ſpecies of plantain.

GRAMINEOUS CROWN, in antiquity, the ſame with the obſidional one. See the article CROWN.

GRAMINEOUS PLANTS, thoſe with narrow, oblong leaves, without any pedicle; ſuch are graſſes, pinks, &c.

GRAMMAR, γραμματικη, the art of ſpeaking and writing any language with propriety.

GRAMMAR is alſo uſed for a book containing the rules of this art, methodically digeſted; of which there are multitudes indeed, but few good ones.

GRAMMARIAN, one that is ſkilled in, or teaches grammar.

GRAMMATICAL, in general, ſomething belonging to grammar. See the article GRAMMAR.

GRANADIER, a ſoldier armed with a ſword, a firelock, a bayonet, and a pouch full of hand-granadoes. They wear high caps, are generally the talleſt and briſkeſt fellows, and are always the firſt upon all attacks.

Horſe-GRANADIERS, called by the French *grenadiers volans*, or flying-granadiers, are ſuch as are mounted on horſeback, and fight on foot: their exerciſe is the ſame with the other granadiers.

GRANADILLA, paſſion-flower, a plant called by Linnæus paſſiflora. See the article PASSIFLORA.

GRANADO, a hollow ball or ſhell, of iron or other metal, about two inches and a half in diameter, which, being filled with fine powder, is ſet on fire by means of a ſmall fuſee faſtened to the touch hole, made of the ſame compoſition as that of a bomb: as ſoon as the fire enters the ſhell, it burſts into many pieces, much to the damage of all that ſtand near. See the article BOMB.

Thuanus obſerves, that the firſt time grenadoes were uſed, was at the ſiege of Wachtendonck, a town near Gueldres; and that the inventor was an inhabitant of Venlo, who, in making an experiment thereof, occaſioned two-thirds of that city to be burnt, the fire being kindled by the fall of a granado.

GRANARY, a building to lay or ſtore corn in, eſpecially that deſigned to be kept a conſiderable time.

GRAND, a term borrowed from the French, implying the ſame with great.

GRAND-JURY, the jury who find bills of indictment at the ſeſſions, &c. of the peace.

GRANGE, a houſe or farm furniſhed with granaries and barns for holding corn, ſtables for horſes, ſtalls for cattle, &c.

GRANIFEROUS PODS, among botaniſts, are ſuch as contain ſmall ſeeds reſembling grain.

The word is compounded of the Latin, *granum*, grain, and *fero*, to bear.

GRANITE, *Granita*, in natural hiſtory, a diſtinct genus of ſtones, compoſed of ſeparate and very large concretions, rudely compacted together, of great hardneſs, and capable of receiving a very beautiful poliſh.

GRANIVOROUS, in natural hiſtory, an epithet given to animals that feed on corn or ſeed.

The word is compounded of the Latin, *granum*, grain, and *voro*, to devour.

GRANULATION, in metallurgy, the action of reducing metals to ſmall particles in order to promote their fuſion and mixture with other bodies.

GRAPES, the fruit of the vine. See the article VINE.

GRAPE-HYACINTH. See the article MUSCARI.

GRAPHOMETER, among ſurveyors, an inſtrument for taking angles, and generally called a ſemi-circle. See SEMI-CIRCLE.

GRAPPLING, in the ſea-language, a ſort of ſmall anchor with four or five flukes or arms, commonly uſed to ride a boat. See ANCHOR.

Fire GRAPLING, an inſtrument nearly reſembling the above, only that it is fitted with ſtrong barbes in the room of flukes; and is fixed at the yard arms of a fire-ſhip, to grapple her adverſary, and ſet her on fire.

GRASS, *Gramen*, in botany, a general name for moſt of the herbaceous plants uſed in feeding cattle.

GRASS-PLATS, and green walks, are made, for the moſt part, not by ſowing graſs-ſeed, but by laying turfs: and, indeed, the turfs from a fine common, or down, are much preferable to ſown graſs: but if walks or plats are to be made by ſowing, the beſt way is to procure the ſeed from thoſe paſtures where the graſs is naturally fine and clear, or elſe the trouble of keeping it from ſpiry or benty graſs will be very great, and it will ſcarce ever look handſome.

In order to ſow graſs-walks, the ground muſt be firſt dug; and when it has been firſt dreſſed and laid even, it muſt be very carefully raked over, and all the clods and ſtones taken off, and then covered over an inch thick with good mould. This being done, the ſeed is to be ſown pretty thick, that it may come up cloſe and ſhort; it muſt then be raked over again, to cover the ſeed, that if the weather ſhould happen to be windy, it may not be blown away. It ought alſo to be obſerved, that where graſs is ſown in gardens, either for lawns or walks, there ſhould always be a good quantity of the white trefoil, or Dutch clover, ſown with it; for this will make a fine turf much ſooner than any other ſown graſs, and will continue a better verdure than any other of the graſs tribe.

In order to keep graſs-plats or walks handſome, and in good order, you may ſow in autumn freſh ſeed over any places that are not well filled, or where the graſs is dead; but nothing improves graſs ſo much, as mowing and conſtant rolling.

When turf is laid in gardens, it is a general practice to cover the ſurface of the ground, under the turf, either with ſand or very poor earth; the deſign of this is, to keep the graſs fine, by preventing its growing too rank. This is proper enough for very rich ground, but it is not ſo for land that is poor; for when this is practiſed in ſuch places, the graſs will ſoon wear out and decay in patches.

GRASSHOPPER, in zoology, a ſpecies of the gryllus, frequent in paſtures. See GRYLLUS.

GRATINGS, in ſhip-building, certain hatches or covers laid over the hatchways of a ſhip, and croſſed with battens of wood, ſo as to let the light down between the decks of a ſhip. See HATCHES.

GRATIOLA, hedge-hyſſop, in botany, a genus of plants, whoſe flower is monopetalous and ringent; it hath five ſubulated filaments, topped with roundiſh antheræ. The fruit is an oval, acuminated capſule, compoſed of two valves, and containing two cells, which are filled with a number of ſmall ſeeds.

It is good in dropſies, jaundices, and other chronic complaints, taken in infuſion; and though a rough and violent medicine, is reckoned a very powerful one.

GRAVE, in muſic, is applied to a ſound of a low or deep tone.

GRAVE *Accent*, in grammar, is a mark placed in this manner [`] over ſome vowel, and implies that the voice ſhould be lowered in pronouncing that ſyllable.

GRAVEL, in natural hiſtory, is a congeries of ſmall pebbles, which, being mixed with a ſtiff loam, makes laſting and elegant walks in our gardens.

Opinions, with regard to the choice of gravel, are various; ſome are for having it as white as poſſible, and in order to render it the more ſo, cauſe the walks to be often rolled with ſtone rollers, which add a whiteneſs to the ſurface. But this renders them very troubleſome to the eyes, by reflecting too ſtrongly the rays of light: ſuch gravel, therefore, as will lie ſmooth and reflect the leaſt, ſhould be preferred. Again, ſome ſcreen the gravel too fine, but this is an error; for if it be caſt into a round heap, and the great ſtones only are raked off, it will be the better. There are many kinds of gravel which do not bind, and by this means cauſe a continual trouble of rolling, to little or no purpoſe; as for ſuch, if the gravel be looſe or ſandy, you ſhould take one load of ſtrong loam and two of gravel, and ſo caſt them well together.

The beſt and moſt eſteemed gravel is that of Black-heath, in Kent, which being mixed with a proper proportion of loam (found alſo on the ſame common) makes the moſt beautiful and laſting walks any where; nor is it confined to a few places about London, for we have known ſeveral tons of it exported to adorn the pope's garden at Rome, although it may be ſuppoſed ſo much beneath his holineſs's dignity to tread upon it; but Italy cannot produce a more handſome terra firma.

The month of March is the propereſt time for laying gravel; for it is not prudent to do it ſooner, or to lay walks in any of the winter months before that time. In making theſe walks, great regard muſt be had to the level of the ground, ſo as to lay the walks with eaſy deſcents toward the low parts of the ground, that the wet may be eaſily drained off: but when the ground is level, it will be proper to have ſink-ſtones laid by the ſides of the walk, and at convenient diſtances, to let off the wet; and when the ground is naturally dry, the drains from the ſink-ſtones may be contrived ſo as to convey the water into ſeſſpools, from which the water will ſoak away in a ſhort time; but in wet lands there ſhould be under-ground drains, to convey the water off, either into ponds, ditches, or the neareſt place proper to receive it.

Some are apt to lay gravel-walks too round, but this is an error; becauſe they are not ſo good to walk upon; and beſides, it makes them look narrow; one inch is enough in a crown of five feet; and it will be ſufficient, if a walk be ten feet wide, that it lies two inches higher in the middle than it does on each ſide; if fifteen feet, three inches; if twenty feet, four inches; and ſo in proportion.

For the depth of gravel-walks, ſix or eight inches may do well enough; and a foot in thickneſs will be ſufficient for any; but then there ſhould always be a depth of rubbiſh laid under the gravel, eſpecially if the ground be wet.

Some turn up gravel-walks into ridges, in December, in order to kill the weeds; but this is very wrong, ſince it never anſwers the end; and, therefore, if conſtantly rolling them after rain and froſt, will not effectually kill the weeds and moſs, you ſhould turn the walks in March, and lay them down at the ſame time.

In order to deſtroy worms that ſpoil the beauty of gravel or graſs walks, ſome recommend the watering them with water made very bitter, by ſteeping walnut-tree leaves in it; but if, in the firſt laying of the walks, there be a good bed of lime-rubbiſh laid at the bottom, it will prove the moſt effectual method to keep out the worms, for they never harbour near lime.

GRAVEL-BIND. See the article CONVOLVULUS.

GRAVEL, in medicine, a very painful diſtemper, ariſing from a gritty matter concreting into ſmall ſtones in the kidneys and bladder. See the article STONE.

GRAVELLING, an accident that often happens to a horſe in travelling, occaſioned by ſome ſmall gravel ſtones getting between the hoof and the ſhoe, where they feſter and fret the part.

It is cured by taking off the ſhoe, picking out all the gravel, waſhing the part affected, and then pouring upon it hot, a compoſition of ſheep's tallow and bay ſalt melted together.

GRAVELLY *Land*, that which abounds with gravel and ſand.

The beſt manure of theſe lands is marl, or any ſtiff clay that will diſſolve with the froſt, cow dung, chalk, mud, and half rotten ſtraw from the dunghill.

GRAVER, the name of a tool by which all the lines, ſcratches, and ſhades, are engraved on copper, &c.

There are three ſorts of gravers, round-pointed, ſquare-pointed, and lozenge-pointed. The round are beſt for ſcratching; the ſquare-pointed for cutting the larger ſtrokes; and the lozenge-pointed for the moſt delicate ſtrokes: but a graver of a middle form, between the ſquare and lozenge pointed, will make the ſtrokes or hatches appear with more life and vigour. See ENGRAVING.

GRAVING, among ſea-men, the act of cleaning a ſhip's bottom. See CAREEN and DOCK, where this operation is particularly explained.

GRAVITATION, in philoſophy, the preſſure which one body exerts upon another by reaſon of its gravity. See ATTRACTION.

GRAVITY, the natural tendency which all bodies have towards a center. See ATTRACTION.

GRAVITY, in mechanics, the tendency of bodies towards the center of the earth. Gravity is of two kinds, abſolute and relative, or ſpecific.

Abſolute GRAVITY is the whole force with which a body tends downwards, or towards the center of the earth, and is always equal to the quantity of matter the body contains, without any regard to its bulk; ſo that the abſolute gravity of a pound of wood is equal to that of a pound of iron.

Relative or *Specific* GRAVITY is the exceſs of gravity of one body above that of another of equal dimenſions, and is always proportionable to the quantity of matter under that dimenſion. Thus a cubic inch of iron is heavier than a cubic inch of wood; for the iron being more denſe than the wood, contains a greater quantity of matter under the ſame bulk.

For the method of finding the ſpecific gravities of bodies, ſee *Hydroſtatical* BALANCE.

GRAVITY *of the Air*. See AIR and ATMOSPHERE.

GRAY, or GREY, in horſemanſhip. See the article GREY.

GREASE, in farriery, a ſwelling and gourdineſs of the legs of a horſe.

This diſeaſe is generally the effects of a faulty blood, and happens moſtly to horſes of a groſs conſtitution; ſometimes it is owing to careleſſneſs in the perſons that look after them, for want of keeping their limbs clean and dry; but for the moſt part horſes that run late in the winter at graſs are the moſt ſubject to it; their blood by that means growing poor and dropſical, expoſes them firſt to ſwell in their limbs, and then to eruptions, which diſcharge a fœtid ſtinking matter reſembling melted glue, and when it turns ſharp and corroſive, it becomes very troubleſome. Sometimes the greaſe breaks out only behind, ſometimes before; and when the conſtitution is very bad, it will break out in all the four limbs at the ſame time.

When the heels are very much ſwelled and full of hard ſcabs, it is neceſſary to begin the cure with poultices, which may be made with either turneps or rye-flower, turpentine, and hogs lard, mixed with ſpirit of wine or red wine-lees; and when the horſe comes to move his limbs with leſs ſtiffneſs, it will be proper to purge him, which, in ſome caſes, muſt be repeated five or ſix times before you can obtain the deſired effect. Where there are pretty large ſwellings in the limbs, diuretics that work powerfully by urine, often ſucceed better than purges.

Molten GREASE, a diſtemper incident to very fat horſes from over-riding, or any violent exerciſe.

It is known by the horſe's voiding a greaſy matter with his dung; though this ſymptom ſometimes attends fat horſes that ſtand much in the ſtable, and have but very little exerciſe, on their catching the leaſt cold. But when a horſe's greaſe is really melted, it is always accompanied with a fever, heat, reſtleſſneſs, ſtarting tremors or tremblings, great inward ſickneſs, ſhortneſs of breath, and ſometimes with the ſymptoms of a pleuriſy.

In order to cure this diſeaſe, it is neceſſary to bleed plentifully in order to empty the veſſels; and ſeveral rowels or iſſues ſhould be cut in different parts of his body. Glyſters are alſo of great ſervice, and ought to be rather of the emollient kind, than purgative, as they are principally intended to cool the inteſtines; all the other internals ought likewiſe to be cleanſing, attenuating, and opening.

GREAT, a term of compariſon, applied to things of large or extraordinary dimenſions, &c.

GREAT *Circles of the Sphere*, are ſuch as divide the ſphere into two equal parts or hemiſpheres, in contradiſtinction to the leſſer circles, which cut the ſphere into unequal parts. See SPHERE.

GREAT *Circle Sailing*. See the article SAILING.

GREEK, or GRECIAN, ſomething relating to ancient Greece.

Greek *Bible.* See the article **Bible.**

Greek *Church*, that part of the Chriſtian church eſtabliſhed in Greece and other parts of Turkey.

Greek *Language*, the language ſpoken by the ancient Greeks, and ſtill preſerved in the writings of Plato, Ariſtotle, Demoſthenes, Thucydides, Xenophon, Homer, Heſiod, &c.

The Greek language was that of a people who had a taſte for the arts and ſciences, which they happily cultivated; and hence it abounds with very ſignificative terms, which are often borrowed by the moderns, and applied to any new diſcovery, inſtrument, machine, &c.

Greek *Orders*, in architecture, are the Doric, Ionic, and Corinthian; the other two, namely, the Tuſcan and Compoſite, being called the Latin orders.

Greek *Valerian*, in botany. See **Polemonium.**

GREEN, one of the original colours of the rays of light. See the article **Colour.**

Green, among painters and dyers, is a colour produced by a mixture of yellow and blue, which will be either deeper or lighter in proportion to the quantity of yellow uſed in the compoſition.

Green-Cloth, a board or court of juſtice, held in the compting-houſe of the king's houſhold, compoſed of the lord-ſteward, and the officers under him, who ſit daily, and take cognizance of matters of juſtice within the verge of the court, which extends about two hundred yards every way from the laſt gate of the palace where his majeſty reſides.

Green-Finch, in ornithology, the Engliſh name of the greeniſh fringilla, having its wings and tail variegated with yellow. It is a very common bird with us, and ſomething larger than the chaffinch.

GREENHOUSE, a conſervatory, or houſe erected in a garden, for the preſervation of thoſe ſorts of plants which cannot endure the cold of our winters if expoſed to the open air.

A greenhouſe is diſtinguiſhed from a ſtove to hot-houſe by its not having much artificial heat uſed in it; therefore thoſe plants which are uſually placed in it are not very tender, and will bear to be out in the open air during the ſummer ſeaſon. In plate LX. *fig.* 1. is exhibited a view of a greenhouſe with two glaſs caſes adjoining to the ends; theſe may be uſed for the preſervation of ſucculent plants, or for forcing roſes, ſtrawberries, &c. according to the fancy of the owner; and vines may be trained within-ſide from the bottom without, whereby in ſummer they will produce excellent bunches of the fineſt and moſt delicious grapes, of thoſe ſorts which would not ripen without doors with us, and would alſo be a good ſucceſſion to thoſe grapes which are forced in the ſtove. The length of theſe glaſs caſes may be from ten to twenty-five feet, and eight or nine feet in width, with flues, *f*, in the back, to be uſed in damp or froſty weather; the door-way, *a*, at thoſe times may be opened, which will admit from the glaſs-caſes ſo much warmth into the greenhouſe as to keep out the froſt, which is all the artificial heat required. The upper part of the ſouth ſide of the roof of the greenhouſe may be tiled or ſlated, under which ſhutters ſhould be ſo contrived that by means of lines and pullies they may be let down on the glaſſes or pulled up at pleaſure, theſe will be a good ſecurity againſt froſt, ſnow, or hail; the pillars in front ſhould not be broader than may be thought neceſſary for the ſupport of the roof, for there cannot be too much light in a greenhouſe; the glaſſes in front ſhould be ſliding ſaſhes, in order to give air to the plants at proper times; theſe ſhould have ſhutters which may fold back againſt the piers within ſide, the middle one ſhould be a glaſs door, for the conveniency of bringing in or carrying out the plants; this need not be uſed at other times, as there are other entrances into the greenhouſe, as out of the glaſs caſes at *a*, or from the ſheds at *b*; theſe ſheds are very convenient for tools and other purpoſes, as likewiſe they keep the back of the caſes warm; and it would not be amiſs if one was continued behind the greenhouſe, to prevent the froſt and damps entering that way, otherwiſe the back requires a greater thickneſs of brick-work. In the ſection, the ſpace marked *r*, between the roof and the ceiling *c*, ſhould be filled up with ſtraw, peaſe-haum, reeds, fern, or ſome ſuch matter, to prevent the froſt penetrating that way. The depth of the greenhouſe ſhould not be leſs than twelve feet, nor more than twenty, we think about fifteen or ſixteen feet a good dimenſion, for if it exceeds twenty, there muſt be more rows of plants placed to fill the houſe than can with convenience be reached in watering and cleaning; nor are houſes of too great depth ſo proper for keeping of plants as thoſe of a moderate ſize: as to the length, it ſhould be proportioned to the quantity of plants it is to contain; about fifty feet is a moderate length, when the width is about fifteen, for if it is longer, the middle part of the houſe will receive no benefit of the fires in ſevere froſts. The height of the ſaſhes in front of the greenhouſe may be from eight to ſixteen feet, and ſhould be glazed with crown glaſs, but the ſlope parts of both places ſhould be glazed with green glaſs, for if they are glazed with crown glaſs, the leaves of the plants are very apt to be burnt in different places, in hot ſun ſhine days in March or April, which frequently happens by the uneven panes collecting the rays of the ſun to a focus, but the green glaſs is not ſo likely to do ſo: the cieling and the walls ſhould be ſtuccoed, or plaiſtered and white-waſhed, but ſtucco is beſt, as it does not rub or peel off; this is neceſſary to help to keep out the froſts, as alſo to reflect

PLATE LX. *Facing* Greenhouſe

Greenhouse.

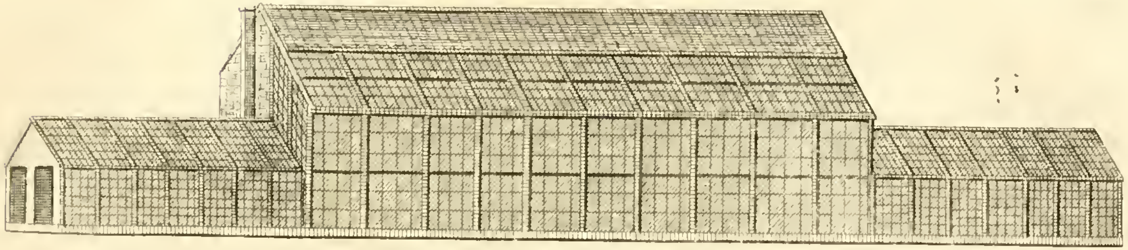


Fig.1.

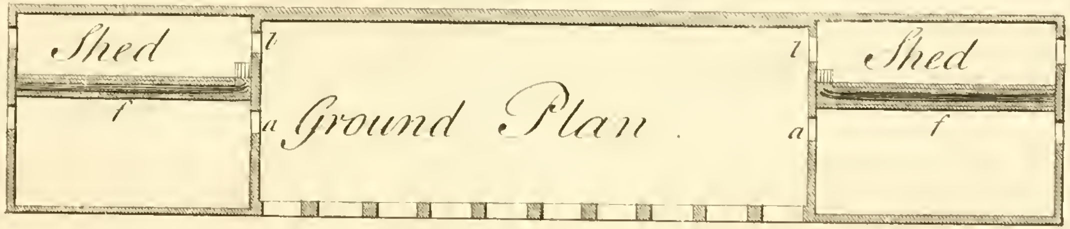


Fig.3. Honey-comb.

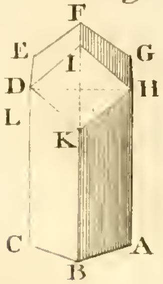


Fig.2. Hexagon.

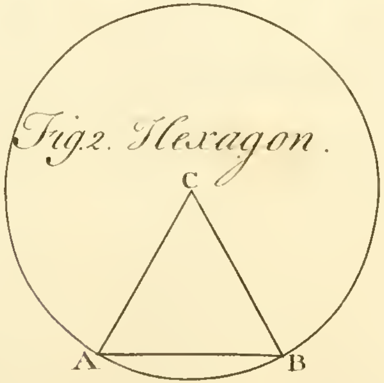
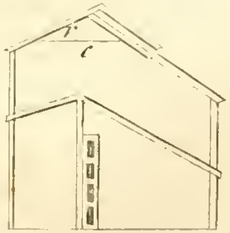


Fig.1. Section.



T. Lodge sculp.

e p

reflect the light, for there cannot be too much light, as was obſerved before. The floor of the greenhouſe, &c. which ſhould be laid either with Bremen ſquares, Purbeck ſtone, broad tyles, or hard bricks, according to the fancy of the owner, muſt be raiſed a foot at leaſt above the ſurface of the ground whereon the houſe is placed; but if the ſituation is moiſt and ſpringy, and thereby ſubject to damps, it ſhould be raiſed at leaſt three feet above the ſurface; and if the whole is arched with low brick arches under the floor, it will be of great ſervice in preventing the damps riſing in winter, which are often very hurtful to the plants, eſpecially in great thaws, when the air is often too cold to be admitted into the houſe to take off the damps.

In this greenhouſe the plants are to be diſpoſed ſo as to form a riſing ſurface from the front to the back; truſſels of different heights are neceſſary to place the plants on when their heights are too equal, the loweſt row ſhould be forwardeſt next the windows, leaving a ſpace to walk along; the rows of plants ſhould riſe gradually from the firſt, in ſuch a manner that the heads of the ſecond row ſhould be entirely advanced above the firſt, the ſtems being only hid thereby, and ſo on for the reſt. At the back of the houſe within-ſide there ſhould be a paſſage left of four or five feet, for the conveniency of watering the plants, as alſo to admit of a current of air round them, that the damps occaſioned by the perſpiration of the plants may be better diſſipated, which by being pent in too cloſely often occaſions a mouldineſs upon the tender ſhoots and leaves; and when the houſe is cloſe ſhut up, this ſtagnating rancid vapour is often very deſtructive to the plants, for which reaſon they ſhould never be crowded cloſe together. In the principal houſe ſhould be placed the moſt admired evergreens, ſuch as orange, lemon, and citron trees, myrtles, geraniums, &c. the lemon and citron trees next the fire (ſee the plan) they being more tender than the orange; and where there are various ſorts of plants they ſhould be ſo diſpoſed that their different foliage and tints of green may make an agreeable contraſt; but as to the ſeveral ſorts of ſucculent plants, ſuch as aloes, ſedums, torch thiſtles, melon-thiſtles, euphorbiums, &c. (as was before obſerved) they ſhould be placed in the glaſs-caſe by themſelves, as there is a great difference in nature between evergreens, herbaceous plants, and thoſe we call ſucculent.

The ſloping glaſſes of theſe caſes ſhould be made to ſlide, the upper ones over the lower, which may be fixed, as alſo the front glaſſes may be contrived one to ſlide by the other, this is abſolutely neceſſary to admit air to the plants in warm weather in a greater or leſſer quantity according as there may be occaſion.

But, beſides the conſervatories here mentioned, it will be proper to have a deep hot bed frame, ſuch as is commonly uſed to raiſe large annuals in the ſpring; into which may be ſet pots of ſuch plants as come from Carolina, Virginia, &c. while the plants are too ſmall to plant in the open air; as alſo may other ſorts from Spain, &c. which require only to be ſcreened from the violence of the froſts, and ſhould have as much free air as poſſible in mild weather; which can be no better effected than in one of theſe frames, where the glaſſes may be taken off every day when the weather will permit, and put on every night; and in hard froſts, the glaſs may be covered with mats, ſtraw, peaſe-haulm, or the like, ſo as to prevent the froſt from entering the pots to freeze the roots of the plants, which is what will, many times, utterly deſtroy them; though a ſlight froſt pinching the leaves or ſhoots very ſeldom does them much harm: if theſe are ſunk a foot or more below the ſurface of the ground, they will be the better, provided the ground is dry; otherwiſe they muſt be wholly above ground: the ſides of this frame ſhould be built with brick, with a curb of wood laid round on the top of the wall, into which the gutters, on which the glaſſes ſlide, may be laid: the back wall of this frame may be about five feet high, and the front three feet, the width about ſix feet, and the length in proportion to the number of plants: as the plants which this frame is deſigned to protect during the winter are hardy enough to admit of being removed out of it in April, it may be uſed for raiſing in the ſummer a crop of melons, &c. which will keep it fully employed all the year.

GREGARIOUS, an epithet applied to ſuch animals as live together in flocks or herds.

GREGORIAN *Calendar*. See the article CALENDAR.

GREGORIAN *Year*. See YEAR.

GREWIA, in botany, a genus of plants whoſe flower conſiſts of a coriaceous coloured calyx, compoſed of five lanceolated leaves, the corolla is formed of five petals of the ſhape of the cup, but leſs, and emarginated at the baſe; the ſtamina are compoſed of a very great number of ſetaceous filaments, topped with roundiſh antheræ. The fruit is a quadrangular berry having four cells, each incloſing a globoſe ſeed.

GREWT, among miners, implies earth of a different colour from the reſt, found on the banks of rivers as they are ſearching for mines.

GREY, or GRAY, a mixed colour compounded of black and white. See COLOUR.

GRIFFON, in heraldry, an imaginary animal, ſuppoſed by the ancients to be half eagle and half lion.

GRINDING, *Trituratio*, the reducing hard ſubſtances to fine powders, by means of mills, rubbing them in a mortar, or with a muller on a marble.

GRIPE, in huſbandry, a ſmall ditch cut acroſs a meadow or ploughed land, in order to drain it.

GRIPES, among ſailors, certain ropes hooked to the decks of a ſhip, and drawn tight over the boats, to ſecure and prevent them from being ſhaken by the agitation of a ſhip at ſea.

GRIPING, in the ſea language, the inclination of a ſhip to run to the windward of her courſe, when ſhe ſteers with a wind on either quarter.

This is partly occaſioned by the ſhock of the waves which ſtrike her on her weather-quarter, but chiefly by the arrangement of the ſails, which diſpoſe her at ſuch a time to edge continually to windward. See the article QUARTER.

GRIST, in country affairs, implies corn already ground or ready for grinding.

GROAT, an Engliſh money of account, equal to four-pence.

GROGRAM, among manufacturers, a kind of ſtuff compoſed of ſilk and mohair.

GROIN, *Pubes*, in anatomy. See the article PUBES.

GROOM, a name applied to ſeveral ſuperior officers belonging to the king's houſhold.

GROOM is more particularly uſed for a ſervant appointed to attend horſes in the ſtable.

GROMMET, among ſailors, a ſort of wreath or ring of rope to faſten a ſail to any ſtay, upon which it is drawn along at the time of hoiſting and lowering it, by the help of theſe grommets, as a curtain is extended or drawn together along its rod by the aſſiſtance of rings.

GROOVE, among miners, the ſhaft or pit ſunk into the earth, whether in the vein or not.

GROOVE, among joiners, implies the channel made by their plough in the edge of a moulding, &c.

GROSS-WEIGHT, among merchants, ſignifies the whole weight of any commodity, including the duſt, droſs, and bag, cheſt, &c. in which it is contained.

GROSSULARIA, the gooſeberry and currant-buſhes. See RIBES and GOOSEBERRY.

GROTESQUE, ſomething whimſical, extravagant, and monſtrous.

GROTTO, in natural hiſtory, a large deep cavern in ſome rock or mountain.

GROTTO is alſo uſed for a ſmall artificial edifice made in a garden, in imitation of a natural grotto.

The outſides of theſe grottos are uſually adorned with ruſtic architecture, and their inſide with ſhell-work, coral, &c. and alſo furniſhed with various fountains, and other ornaments.

GROVE, in gardening, a ſmall wood impervious to the rays of the ſun.

Groves are the greateſt ornaments to a garden; nor can a garden be complete which has not one or more of theſe. In ſmall gardens there is ſcarce room to admit of groves of any extent: yet, in theſe, there ſhould be at leaſt one contrived, which ſhould be as large as the ground will allow it: and, where theſe are ſmall, there is more ſkill required in the diſpoſition, to give them the appearance of being larger than they really are.

Groves are of two ſorts, viz. open and cloſe; open groves are ſuch as have large ſhady trees, which ſtand at ſuch diſtances, as that their branches may approach ſo near to each other, as to prevent the rays of the ſun from penetrating through them: but as ſuch trees are a long time in growing to a proper ſize for affording a ſhade, ſo, where new groves are placed, the trees muſt be placed cloſer together, in order to have ſhade as ſoon as poſſible; but, in planting of theſe groves, it is much the beſt way to diſpoſe all theſe trees irregularly, which will give them a greater magnificence, and alſo form a ſhade ſooner, than when the trees are planted in lines; for, when the ſun ſhines between the rows of trees, as it muſt do ſome part of the day in ſummer, the walks between them will be expoſed to the heat, at ſuch times, until the branches of theſe trees meet; whereas, in the irregular plantations, the trees intervene, and obſtruct the direct rays of the ſun.

When a perſon, who is to lay out a garden, is ſo happy as to meet with large full grown trees upon the ſpot, they ſhould remain inviolate, if poſſible; for it will be better to put up with many inconveniencies, than to deſtroy theſe, which will require an age to retrieve; ſo that nothing but that of offending the habitation, by being ſo near as to occaſion great damps, ſhould tempt the cutting them down.

Moſt of the groves which have been planted either in England, or thoſe celebrated gardens in France, are only a few regular lines of trees; many of which join to the habitation, or lead to ſome building, or other object: but theſe do not appear ſo grand, as thoſe which have been made in woods, where the trees have grown accidentally, and at irregular diſtances; where the trees have large ſpreading heads, and are left at ſuch diſtance as to permit the graſs to grow under them, then they afford the greateſt pleaſure; for nothing is more noble than fine ſpreading trees with large ſtems, growing through graſs, eſpecially if the graſs is well kept, and has a good verdure; beſide, moſt of theſe planted groves have generally a gravel walk, made in a ſtraight line between them; which greatly offends the ſight of perſons who have a true taſte: therefore, whenever a gravel walk is abſolutely neceſſary to be carried through theſe groves, it will be much better to twiſt it about, according as the trees naturally ſtand, than to attempt regularity: but dry walks under large trees are not ſo uſeful as in open places; becauſe the dropping of the trees will render theſe walks uſeleſs, after rain, for a conſiderable time.

Cloſe groves have frequently large trees ſtanding in them; but the ground is filled under theſe with ſhrubs, or under-wood; ſo that the walks which are made in them are private, and ſcreened from the winds; whereby they are made agreeable for walking, at ſuch times when the air is too violent or cold for walking in the more expoſed part of the garden.

Theſe are often contrived ſo as to bound the open groves, and frequently to hide the walls, or other incloſures, of the garden: and when they are properly laid out, with dry walks winding through them, and on the ſides of theſe, ſweet-ſmelling ſhrubs and flowers irregularly planted, they have a charming effect: for here a perſon may walk in private, ſheltered from the inclemency of cold or violent winds, and enjoy the greateſt ſweets of the vegetable kingdom: therefore, where it can be admitted, if they are continued round the whole encloſure of the garden, there will be a much greater extent of walk: and theſe ſhrubs will appear the beſt boundary where there are not fine proſpects to be gained.

Theſe cloſe groves are by the French termed boſquets, from the Italian word boſquetto, which ſignifies a little wood: and in moſt of the French gardens there are many of them planted; but theſe are reduced to regular figures, as ovals, triangles, ſquares, and ſtars: but theſe have neither the beauty or uſe which thoſe have that are made irregularly, and whoſe walks are not ſhut on each ſide by hedges, which prevents the eye from ſeeing the quarters; and theſe want the frangrancy of the ſhrubs and flowers, which are the great delight of theſe private walks; add to this, the keeping of the hedges in good order, is attended with a great expence; which is a capital thing to be conſidered in the making of gardens. *Miller's Gard. Dict.*

GROUND, in agriculture; ſee EARTH and SOIL.

GROUND, in painting, the ſurface upon which the figures and other objects are repreſented.

The ground is properly underſtood of ſuch parts of the piece as have nothing painted on them, but retain the original colours upon which the other colours are applied to make the repreſentations.

A building is ſaid to ſerve as a ground to a figure, when the figure is painted on the building.

GROUND-ANGLING, a method of angling without a float, only with a plumb of lead, or rather a bullet, becauſe it will roll on the ground.

GROUND-IVY, hedera terriſtris, in botany; ſee IVY.

GROUND-PINE, in botany; ſee CHAMEPITYS.

GROUND-TAKLE, among ſailors, all ſorts of ropes which belong to the anchors, or for mooring a ſhip; as cables, hawſers, tow-lines, warps, buoy-ropes, &c.

GROUND-WORK, among builders; ſee FOUNDATION.

GROUNDING, in the ſea language, a ſhip is ſaid to ground when ſhe ſtrikes and reſts upon the ground.

GROUNDSEL, in botany; ſee SENECIO.

GROUP, in painting and ſculpture, an aſſemblage of two or more figures of men, beaſts, fruits, &c. which have ſome apparent reſemblance to one another.

GROUSE, or GROWSE, the name of a very valuable bird, of the ſize of a full-grown foul. Its head is large, and adorned with a very beautiful ſcarlet protuberance over the eyes, which are remarkably piercing. It is a native of England, tho' not very common, and lives on large mountainous heaths.

GROWAN, among the Corniſh miners, implies a coarſe gritty ſtone of a greyiſh colour, which they are often obliged to dig through, before they reach the tin ore.

GRUB, the Engliſh name of the hexapode worms, or maggots, hatched from the eggs of beetles.

GRUBS, in medicine, certain unctuous pimples riſing on different parts of the face, particularly in the alæ of the noſe. They are cured by cooling phyſic, and ſuch medicines as have a tendency to cleanſe the blood.

GRUBBING, a term uſed by our farmers to ſignify the taking up the roots of trees.

GRUME, *Grumus*, in medicine, implies a concreted clot of blood, milk, or other ſimilar ſubſtance.

GRUS, the crane, in ornithology, a bird of the heron kind. See CRANE.

GRYLLOTALPA, the mole cricket, in natural hiſtory, a creature approaching to the locuſt kind, and very properly called by this name by Moffet, as it has much of the form of the cricket, and makes a noiſe like it in the evening; and is, like the mole, continually employed in digging the ground.

GRYLLUS, in zoology, the name of the cricket and locuſt kind, which, together with the graſshopper, form one genus of inſects.

GUAIACUM, or GUAJACUM, in botany, a genus of plants, the flower of which conſiſts of a monophyllous cup, cut into five parts, the corolla is compoſed of five obato-oblong concave petals, which ſpread open. The fruit is a roundiſh, obliquely acuminated drupe, deeply furrowed, incloſing a hard nut.

The wood of guaiacum is extremely hard and ſolid, of a denſe compact texture, and remarkably heavy, ſo as to ſink in water; it is of a blackiſh yellow colour in the middle, and ſometimes variegated. This wood comes over in large pieces, weighing four, five, or more, hundred weight, from Jamaica, Mexico, Porto-rico, St. Domingo, and other parts of the Weſt-Indies; it is of a fragrant ſmell, and of an aromatic and pungent, but ſomewhat bitteriſh, taſte.

When the tree is ſtanding, or newly felled, the bark adheres ſo firmly as not to be got off even with iron tools; after lying for ſome time it ſeparates eaſily. On account of its great hardneſs, ſolidity, and indiſpoſition to crack, it is employed by the turners, and others, for ſeveral of the more curious mechanic uſes. In Holland, at Hamburg, and other places of large commerce, it is raſped in work-houſes eſtabliſhed for that purpoſe, after the ſame manner as the colouring-woods; and from theſe the druggiſt and apothecary are ſupplied.

A ſtrong decoction of guaiacum is uſed as an alterative diet-drink in venereal, cancerous, and other diſorders, from an impurity of the blood and juices. Hoffman recommends the ſpirituous extract (which is the moſt active preparation) as a high antidote againſt the venereal poiſon, provided it be uſed properly, according to the laws of medicine. He mentions alſo another reſinous preparation of this wood, under the title of "A ſingular reſin, of a ſtimulating errhine quality, and poſſeſſing alſo a corroborating power, highly friendly to the nervous parts of the head." This, according to his account, is the reſin that precipitates in boiling down a watery decoction of the wood.

Gum-GUAIACUM, ſo called, is a reſin exuding from the guaiacum-tree. It is of a brown colour, partly reddiſh, and often greeniſh, brittle, of a gloſſy ſurface when broke, of a pungent taſte; and when rubbed or heated, of a not diſagreeable ſmell: its ſmoke, in burning, has ſomewhat the ſmell of that of wood. Such ſhould be choſen as has pieces of the bark adhering, and eaſily parts from them by a few quick blows. The maſſes which have no bark, eſpecially the large ones, are often ſophiſticated. I received for gum-guaiacum, a whole box of an artificial compoſition of colophony and balſam of ſulphur: this abuſe was readily diſtinguiſhable by the ſmell of the compound, when laid upon burning coals, and even by its appearance upon breaking.

Out of an ounce of gum-guaiacum, rectified ſpirit of wine diſſolves ſix drams and two ſcruples: of the remainder, water applied at firſt, extracts four ſcruples out of an ounce: of the reſiduum, ſpirit diſſolves four drams and two ſcruples. In diſtillation, it gives over a little both to water and to ſpirit, ſo little as to be altogether inconſiderable.

Its virtues are the ſame with thoſe of the wood. It is uſed pretty frequently in England, very rarely in Germany, the pure reſin artificially extracted from the wood by means of ſpirit of wine, advantageouſly and elegantly ſupplying its place.

GUAJAVA, or GUAVA, in botany, the name by which Tournefort calls the pſidium of Linnæus. See PSIDIUM.

GUANABANUS, the cuſtard-apple, in botany, a genus of plants whoſe characters are as follow:

The empalement of the flower conſiſts of three ſmall pointed leaves; the flowers of ſome ſorts have only three petals, but in others ſix; in the latter, three are alternately leſs than the others: from the empalement ariſes the pointal, which afterwards becomes an oval, or round, fleſhy, ſoft fruit, incloſing ſeveral oblong, ſmooth, hard ſeeds.

GUARANTY, in policy, the engagement of neutral kindoms or ſtates, whereby they undertake that certain treaties ſhould be inviolably obſerved.

GUARD, in a general ſenſe, ſignifies the defence or preſervation of any thing; the act of obſerving what paſſes, in order to prevent ſurprize; or the care, precaution, and attention we make uſe of, to prevent any thing happening contrary to our intention and inclinations.

GUARD, in the military art, is a duty performed by a body of men, to ſecure an army or place from being ſurprized by an enemy.

In a garriſon, the guards are relieved every day, and it comes to every ſoldier's turn once in three days; ſo that they have two nights in bed, and one upon guard.

To be upon guard, to mount the guard, to diſmount the guard, to relieve the guard, to change the guard, the officer of the guard, or the ſerjeant of the guard, are words often uſed, and well underſtood.

Advanced-GUARD is a party of either horſe or foot, that marches before a more conſiderable body, to give notice of any approaching danger.

When an army is upon the march, the grand-guards, which ſhould mount that day, ſerve as an advanced-guard to the army: in ſmall parties, ſix or eight horſe are ſufficient, and theſe are not to go above four or five hundred yards before the party.

An advanced-guard is alſo a ſmall body of twelve or ſixteen horſe, under a corporal, or quarter-maſter, poſted before the grand-guard of a camp.

Artillery-GUARD is a detachment from the army to ſecure the artillery; their corps-de-garde is in the front, and the centries round the part. This is a forty-eight hours guard: and upon a march, they go in the front and rear of the artillery, and muſt be ſure to leave nothing behind; if a gun or waggon break down, the captain is to leave a part of his guard to aſſiſt the gunners and matroſſes in getting it up again.

Corps-de-GARDE, are ſoldiers entruſted with the guard of a poſt, under the command of one or more officers.

Counter-GUARD, in fortification. See the article COUNTER-GUARD.

Forrage-GUARD, a detachment ſent out to ſecure the forragers, which are poſted at all places, where either the enemy's party may come to diſturb the forragers;

ſorragers; or where they may be ſpread too near the enemy, ſo as to be in danger of being taken. They conſiſt both of horſe and foot, and muſt ſtay at their poſts till the forragers all come off the ground.

Grand-GUARD, three or four ſquadrons of horſe, commanded by a field officer, poſted at about a mile and a half from the camp, on the right and left wings, towards the enemy, for the ſecurity of the camp.

Main-GUARD, that from whence all the other guards are detached.

Picquet-GUARD, a good number of horſe and foot always in readineſs in caſe of an alarm: the horſe are all the time ſaddled, and the riders booted. The foot draw up at the head of the battalion, at the beating of the tattoo; but afterwards return to their tents, where they hold themſelves in readineſs to march, upon any ſudden alarm. This guard is to make reſiſtance, in caſe of an attack, till the army can get ready.

Quarter-GUARD, a ſmall guard, commanded by a ſubaltern officer, poſted by each battalion, about an hundred yards before the front of the regiment.

Rear-GUARD, that part of the army which brings up the rear, which is generally the old grand-guards of the camp. The rear-guard of a party is ſix or eight horſe, that march about four or five hundred paces behind the party. The advanced-guard of a party on its going out, make the rear-guard on its return.

Standard-GUARD, a ſmall guard, under a corporal, out of each regiment of horſe, and placed on foot, in the front of each regiment.

Van-GUARD, that part of the army which marches in the front.

GUARDS alſo imply the troops kept to guard the king's perſon.

Yeomen of the GUARDS. See YEOMEN.

GUARD, in fencing, implies a poſture proper to defend the body from the ſword of the antagoniſt.

GUARD-BOAT, in naval affairs, a boat commanded by a lieutenant, appointed to row around the ſhips in a harbour to ſee that the officers in each ſhip obſerve their watch, and call to the boat as ſhe paſſes, and do not ſuffer them to board without a watch-word.

GUARD-SHIP, a veſſel of war appointed to ſuperintend the marine affairs in a harbour or river, and ſee that the ſhips who are not commiſſioned have their proper watch kept duly every night, alſo to receive and ſecure ſeamen who are impreſſed in the time of war.

GUARDIAN, in law, a perſon who has the charge or cuſtody of ſuch perſon or perſons as have not ſufficient diſcretion to take care of themſelves; as ideots, or children under age.

GUAZUMA, baſtard cedar-tree, in botany, a genus of trees whoſe characters are as follow: It hath a regular flower conſiſting of five leaves, which are hollowed like a ſpoon at their baſe; but at their tops are divided into two parts, like a fork; the flower cup conſiſts of three leaves, from whence ariſes the pointal, which afterwards becomes a roundiſh warted-fruit, which has five cells incloſing many ſeeds.

GUIDON, the name of a ſort of ſtandard carried by the king's life-guards; ſo called from its being broad at one extreme, and almoſt pointed at the other, and ſlit, or divided into two.

GUIDON alſo implies the officer who carries the guidon.

GUILANDINA, in botany, a genus of plants whoſe flower conſiſts of a campanulated cup, with five concave lanceolated petals. The ſtamina are ten ſubulated filaments, topped with obtuſe incumbent antheræ.

The fruit is a ventricoſe, compreſſed rhomboidal pod, having one cell, including oſſeous ſeeds of a globoſe compreſſed form.

GUILD, or GILD, a Saxon word ſignifying a company, or fraternity.

GUILDHALL, the chief hall of a city or corporation where the courts are held.

GUINEA-PEPPER, in botany. See the article CAPSICUM.

GUINEA-PIG, in zoology, a quadruped of the rat kind, with a variegated body, reſembling in ſome meaſure that of a young pig, whence the name.

GUITER, a muſical inſtrument of the ſtringed kind, uſed greatly in Spain, and at preſent in England.

GULA, in anatomy, the ſame with œſophagus. See OESOPHAGUS.

GULA, or GOLA, in architecture, the ſame with cymatium, or ogee. See CYMATIUM and OGEE.

GULES, in heraldry, the true ſcarlet colour, and expreſſed in engraving by lines falling perpendicular from the top of the eſcutcheon to the bottom.

GULPH, in geography, a part of the ſea almoſt ſurrounded by the land.

GUM, in pharmacy, a concreted vegetable juice, which tranſudes through the bark of certain trees, and hardens upon the ſurface.

GUM, among gardeners, a kind of gangrene incident to fruit-trees of the ſtone kind, ariſing from a corruption of the ſap, which, by its viſcidity, not being able to make its way through the fibres of the tree, is, by the protruſion of other juice, made to extravaſate and ouze out upon the bark.

When the diſtemper ſurrounds the branch, it admits of no remedy, but when only on one part of a bough, it ſhould be taken off to the quick, and ſome cow-dung clapped on the wound, covered over with a linen-cloth, and tied down. M. Quintinic directs to cut off the morbid branch two or three inches below the part affected.

GUMS, *Gingivæ*, in anatomy; ſee GINGIVÆ.

GUM-BOILS, a morbid affection of the gums called by writers of ſurgery parulides. Theſe are of different degrees, and uſually ariſe from pains in the teeth. They are to be treated by diſcutients as other inflammatory tumors, but if theſe fail, or the diſorder is neglected, it uſually terminates in an abſceſs or fiſtula. Sage, camomile, and elder flowers, boiled in milk and water, make a good gargariſm to be held in the mouth, and the remaining herbs may be ſewed up in a bag to be kept hot to the cheek. A half roaſted fig is a very good internal application, and, when the ſoftneſs of the tumor ſhews that the matter is ſuppurated, it ought immediately to be opened with the lancet, to prevent the matter's lodging there, and eroding the bone, and producing a fiſtula or caries.

GUN, a fire-arm, or weapon of offence, which forcibly diſcharges a ball, ſhot, or other offenſive matter, through a cylindrical barrel, by means of gun-powder. See the article GUN-POWER.

Gun is a general name, under which are included divers or even moſt ſpecies of fire-arms. They may be divided into great and ſmall.

Great guns, called alſo by the general name cannons, make what we alſo call ordnance, or artillery; under which come the ſeveral ſorts of cannons, as cannon-royal, demi-cannon, &c. Culverins, demi-culvers, ſakers, minions, falcons, &c. See CANNON, CULVERIN, &c. as alſo ORDNANCE and ARTILLERY.

Small guns include muſquets, muſquetoons, carabines, blunderbuſſes, fowling-pieces, &c. See the article MUSQUET, &c.

Piſtols and mortars are almoſt the only ſort of regular weapons, charged with gun-powder, that are excepted from the denomination of guns. See the articles PISTOL and MORTAR.

GUN is alſo a name given by the miners to an inſtrument uſed in cleaving rocks with gun-powder. It is an iron cylinder of an inch and a quarter thick, and about ſix inches long, and having a flat ſide to receive the ſide of a wedge, and a hole drilled thro' it to communicate with the inſide of the hole in the rock. The hole is made of about eight inches deep, and in the bottom of it are put about two or three ounces of gun-powder; then this gun is driven forcibly in, ſo as to fill up the hole, and the wedge is driven in on its flat ſide to ſecure it. The priming at the hole is then fired by a train, and, the orifice being ſo well ſtopped by this gun, the force of the powder is determined to the circumjacent parts of the rock which it ſplits.

GUNNEL, in ſhip-building, the upper-part of a ſhip's ſide.

GUNNER, an officer appointed for the ſervice of the artillery; or a perſon ſkilled in the art of gunnery.

GUNNER *of a Ship of War*, an officer appointed to take charge of the artillery and ammunition abroad; and to teach the men the exerciſe of great guns.

GUNNERY, the art of determining the motion of bodies ſhot from mortars, cannon, &c. See the article PROJECTILE.

GUN-POWDER, a compoſition of ſalt-petre, ſulphur, and charcoal, well mixed together and granulated; which eaſily takes fire, and expands with amazing force.

The invention of this compoſition is aſcribed by Polydore Virgil to a chemiſt, who having accidentally put the ingredients above-mentioned into a mortar, and covered it over with a ſtone, it happened to take fire, and threw off the ſtone. Thevel ſays that this chemiſt was one Conſtantine Anelzen, a monk of Friburg; but Belleforet and others aſſert it to be Bertholdus Schwartz: at leaſt it is affirmed that he firſt taught the uſe of gun-powder to the Venetians, in the year 1380. Peter Mexia however contradicts this account, by ſhewing it to have been uſed by Alponſus XI. king of Caſtile, in the year 1342. Ducange adds, that there is mention made of this powder in the regiſters of the chambers of accounts of France, ſo early as the year 1338; and our countryman, Friar Bacon, expreſsly mentions the compoſition, in his treatiſe *De nullitate Magiæ*, publiſhed at Oxford in the year 1216.

Method of making GUN-POWDER. The following receipe for making gun-powder is taken from Dr. Shaw's Chemical Lectures.

Take four ounces of refined ſalt-petre, an ounce of brimſtone, and ſix drams of charcoal; reduce theſe to a fine powder, and continue beating them for ſome time in a ſtone-mortar, with a wooden-peſtle, wetting the mixture between whiles with water, ſo as to form the whole into an uniform paſte, which is reduced to grains, by paſſing it through a white ſieve for the purpoſe; and in this form, being carefully dried, it becomes the common gun-powder.

For greater quantities, mills are uſually provided, by means of which more work may be performed in one day than a man can do in a hundred. See MILL.

The nitre or ſalt-petre is refined thus: diſſolve four pounds of rough nitre as it comes to us from the Indies, by boiling it in as much water as will commodiouſly ſuffice for that purpoſe; then let it ſhoot for two or three days in a covered veſſel of earth, which ſticks laid acroſs for the cryſtals to adhere to. Theſe cryſtals being taken out, are drained and dried in the open air.

In order to reduce this ſalt to powder, they diſſolve a large quantity of it in as ſmall a proportion of water as poſſible; then keep it conſtantly ſtirring over the fire, till the water exhales, and a white dry powder is left behind. See NITRE.

In order to purify the brimſtone employed, they diſſolve it with a very gentle heat; then ſcum and paſs it through a double ſtrainer. If the brimſtone ſhould happen to take fire in the melting, they have an iron cover that fits on cloſe to the melting veſſel, and damps the flame. The brimſtone is judged to be ſufficiently refined if it melts without yielding any fœtid odour between two hot iron-plates into a kind of red ſubſtance.

The coal for the making of gun-powder is either that of willow, or hazel, well charred in the uſual manner, and reduced to powder: and thus the ingredients are prepared for making this commodity; but as theſe ingredients require to be intimately mixed, and as there would be danger of their firing if beat in a dry form, the method is to keep them continually moiſt, either with water, urine, or a ſolution of ſal ammoniac: they continue thus ſtamping them together for twenty-four hours, after which the maſs is fit for corning and drying in the ſun, or otherwiſe, ſo as ſedulouſly to prevent its firing.

Different kinds of GUN-POWDER. The three ingredients of gun-powder are mixed in various proportions, according as the powder is intended for muſquets, great guns, or mortars; though theſe proportions ſeem not to be perfectly adjuſted, or ſettled by competent experience.

Semienowitz for mortars, directs 100 ℔ of ſalt-petre, 25 ℔ of ſulphur, and as many of charcoal; for great guns, 100 ℔ of ſalt-petre, 15 ℔ of ſulphur, and 18 ℔ of charcoal; for muſquets and piſtols 100 ℔ of ſalt-petre, 8 ℔ of ſulphur, and 10 ℔ of charcoal. Miethius extols the proportion of 1 ℔ of ſalt-petre to three ounces of charcoal, and two or two and a quarter of ſulphur; than which, he affirms, no gun-powder can poſſibly be ſtronger. He adds, that the uſual practice of making the gun-powder weaker for mortars than guns, is without any foundation, and renders the expence needleſsly much greater: for whereas to load a large mortar, 24 ℔ of common powder is required, and conſequently to load it ten times 240 ℔, he ſhews by calculation, that the ſame effect would be had by 150 ℔ of the ſtrong powder.

To increaſe the ſtrength of powder, Dr. Shaw thinks it proper to make the grains conſiderably large, and to have it well ſifted from the ſmall duſt. We ſee that gun-powder, reduced to duſt, has little exploſive force; but when the grains are large, the flame of one grain has a ready paſſage to another, ſo that the whole parcel may thus take fire nearly at the ſame time, otherwiſe much force may be loſt, or many of the grains go away as ſhot unfired.

Method of trying and examining GUN-POWDER. There are two general methods of examining gun-powder; one with regard to purity, the other with regard to its ſtrength. Its purity is known by laying two or three little heaps near each other upon white paper, and firing one of them; for if this takes fire readily, and the ſmoke riſes upright, without leaving any droſs, or feculent matter behind, and without burning the paper, or firing the other heaps; it is eſteemed a ſign that the ſulphur and nitre were well purified, that the coal was good, and that the three ingredients were thoroughly incorporated together; but if the other heaps alſo take fire at the ſame time, it is preſumed that either common ſalt was mixed with the nitre, or that the coal was not well ground, or the whole maſs not well beat, and mixed together; and if either the nitre or ſulphur be not well purified, the paper will be black or ſpotted.

In order to try the ſtrength of gun-powder, there are two kinds of inſtruments in uſe; but neither of them appear more exact than the common method of trying to what diſtance a certain weight of powder will throw a ball from a muſket.

There has been much talk of a white powder, which, if it anſwered the character given it, might be a dangerous compoſition: for they pretend that this white powder will throw a ball as far as the black, yet without making a report; but none of the white powder we have ſeen, ſays Dr. Shaw, anſwers to this character; being, as we apprehend, commonly made either with touchwood or camphor, inſtead of coal.

Obſervations on the Force of GUN-POWDER. Gun-powder fired either in vacuum, or in air, produces by its exploſion a permanent elaſtic fluid: for if a red-hot iron be included in a receiver, after being exhauſted, and gun-powder be let fall on the iron, the powder will take fire, and the mercurial gage will ſuddenly deſcend upon the exploſion; and though it immediately aſcends again, yet it will never riſe to the height it firſt ſtood at, but will continue depreſſed by a ſpace proportioned to the quantity of gun-powder which was let fall on the iron.

The ſame production likewiſe takes place, when gun-powder is fired in the air: for if a ſmall quantity of powder be placed in the upper-part of a glaſs tube, and the lower part of the tube be immerged in water, and the water be made to riſe ſo near the top, that only a ſmall portion of air is left in that part where the gun-powder is placed: if in this ſituation the communication of the upper-part of the tube with the external air be cloſed, and the powder be fired, which will eaſily be done by a burning glaſs, the water will in this experiment deſcend upon the exploſion, as the quickſilver did in the laſt; and will always continue depreſſed below the place at which it ſtood before the exploſion; and the quantity of this depreſſion will be greater, if the quantity of powder be increaſed, or the diameter of the tube be diminiſhed. From whence it is proved, that as well in air as in a vacuum, the exploſion of fired powder produces a permanent elaſtic fluid. It alſo appears from experiment, that the elaſticity or preſſure of the fluid produced by the firing of gun-powder, is, *cæteris paribus*, directly as its denſity. This follows from hence, that if in the ſame receiver a double quantity of powder be let fall, the mercury will ſubſide twice as much as in the firing of a ſingle quantity.

To determine the elaſticity and quantity of this elaſtic fluid, produced from the exploſion of a given quantity of gun-powder, Mr. Robins premiſes, that the elaſticity of this fluid increaſes by heat, and diminiſhes by cold in the ſame manner as that of the air; and that the denſity of this fluid, and conſequently its weight, is the ſame with the weight of an equal bulk of air having the ſame elaſticity, and the ſame temperature. From theſe principles, and from his experiments (for a detail of which, we muſt refer the reader to his New Principles of Gunnery, in Scholium to Prop. II.) he concludes, that the fluid produced by the firing of gun-powder will be $\frac{3}{10}$ of the weight of the gun-powder, and the ratio of the reſpective bulks of the powder, and the fluid produced from it, will be in round numbers 1 to 244.

Hence we are certain, that any quantity of powder, fired in any confined ſpace, which it adequately fills, exerts, at the inſtant of its exploſion, againſt the ſides of the veſſel containing it, and the bodies it impels before it, a force, at leaſt 244 times greater than the elaſticity of common air; or, which is the ſame thing, than the preſſure of the atmoſphere; and this without conſidering the great addition which this force will receive from the violent degree of heat with which it is endued at that time, the quantity of which augmentation is the next head of Mr. Robins's enquiry. He determines that the elaſticity of the air is augmented when heated to the extremeſt heat of red hot iron, in the proportion of 796 to $194\frac{1}{3}$, and ſuppoſing that the flame of fired gun-powder is not leſs hot than red hot iron, and the elaſticity of the air, and conſequently of the fluid, generated by the exploſion, being augmented by the extremity of this heat in the ratio of 796 to $194\frac{1}{3}$, it follows, that if 244 be augmented in the ratio, the reſulting number, which is $999\frac{1}{3}$, will determine how many times the elaſticity of the flame of fired powder, exceeds the elaſticity of common air, ſuppoſing it to be confined in the ſame ſpace which the powder filled before it was fired.

Hence, then, the abſolute quantity of the preſſure exerted by gun-powder, at the moment of its exploſion, may be aſſigned: for, ſince the fluid then generated has an elaſticity of $999\frac{1}{3}$, or, in round numbers, 1000 times greater than common air; and ſince common air, by its elaſticity, exerts preſſure on any given ſurface, equal to the weight of the incumbent atmoſphere, with which it is in equilibrio, the preſſure exerted by fired powder, before it has dilated itſelf, is 1000 times greater than the preſſure of the atmoſphere; and conſequently the quantity of this force on a ſurface of an inch ſquare, amounts to above ſix ton weight, which force, however, diminiſhes as the fluid dilates itſelf. The variations of the denſity of the atmoſphere does not any way alter the action of powder by any experiment that can be made. But the moiſture of the air has a very great influence on the force of it; for that quantity which, in a dry ſeaſon, would communicate to a bullet a velocity of 1700 feet in one ſecond, will not, in damp weather, communicate a velocity of more than 12 or 1300 feet in a ſecond, or even leſs, if the powder be bad and negligently kept.

The velocity of expanſion of the flame of gun-powder when fired in a piece of artillery, without either bullet, or any other body before it, is prodigious. By the experiments of Mr. Robins, it ſeems this velocity cannot be much leſs than 7000 feet in a ſecond. This, however, muſt be underſtood of the moſt active part of the flame: for, as was before obſerved, as the elaſtic fluid in which the activity of gun-powder conſiſts, is only $\frac{3}{10}$ of the ſubſtance of the powder, the remaining $\frac{7}{10}$ will in the exploſion be mixed with the elaſtic part, and will by its weight retard the activity of the exploſion; and yet they will be ſo compleatly united as to move with uncommon motion; but the unelaſtic part will be leſs accelerated than the reſt, and ſome of it will not even be carried out of the barrel, as appears by the conſiderable quantity of unctuous matter which adheres to the inſide of all fire-arms, after they have been uſed. Theſe inequalities in the expanſive motion of the flame render it impracticable to determine its velocity, otherwiſe than from experiments.

To recover damaged GUN-POWDER. The method of the powder-merchants is this; they put part of the powder on a ſail-cloth, to which they add an equal weight of what is really good, and with a ſhovel mingle it well together, dry it in the ſun, and barrel it up, keeping it in a dry and proper place. Others again, if it be very bad, reſtore it by moiſtening it with vinegar, water, urine, or brandy: then they beat it fine, ſearce it, and to every pound of powder add an ounce, an ounce and a half, or two ounces, according as it is decayed, of melted ſalt-petre. Afterwards, theſe ingredients are to be moiſtened and mixed well, ſo that nothing can be diſcerned in the compoſition, which may be known by cutting the maſs; and then they granulate it as aforeſaid. In caſe the powder be in a manner quite ſpoiled, the only way is to extract the ſalt-petre with water, according to the uſual manner, by boiling, filtrating, evaporating, and cryſtallizing; and then with freſh ſulphur and charcoal to make it up a-new again. In regard to the medical virtues of gun-powder, Boerhaave informs us, that the flame of it affords a very healthy fume in the height of the plague, becauſe the exploſive acid vapour of nitre and ſulphur corrects the air; and that the ſame vapour, if received in a ſmall cloſe pent-up place, kills inſects.

GUN-SHOT-WOUNDS, thoſe made by ſhot, bullets, &c. ſhot from ſome ſpecies of fire-arms.

GUNTER's-LINE, called alſo the *Line of Numbers*, and the *Line of Lines*, is a graduated line uſually placed upon ſcales, ſectors, &c. ſo called from Edmund Gunter, its inventor.

This line is no other than a logarithmic ſcale of proportionals, wherein the diſtance between each diviſion is equal to the number of mean proportionals contained between the two terms, in ſuch parts as the diſtance between 1 and 10 is 10000, &c. Wherefore,

If the diſtance betwixt 1 and 10 upon the ſcale be made equal to 10000, &c. equal parts, and .954 &c. the logarithm of 9 of the ſame parts, be ſet off from 1 to 9, it will give the diviſion ſtanding againſt the number 9. In like manner, if .903, .845, .778, which are the logarithms of 8, 7, and 6, of the ſame equal parts, be ſet off from 1 to 8, 7, and 6, they will give the diviſions anſwering to the numbers 8, 7, and 6, upon the line. And after the ſame manner may the whole line be divided.

This line has been contrived various ways, for the advantage of having it as long as poſſible. It was firſt placed, by its inventor Edmund Gunter, on a two feet ſcale. After this, Wingate doubled the line, in order to render it ſuſceptible of working right on or a-croſs. Then, the learned Oughtred projected it in a circle, and alſo made it to ſlide: and, laſtly, it was projected in a kind of ſpiral, by Brown.

But the method of uſing or applying it in all is not very different. In Gunter's and Wingate's projection, common compaſſes are uſed; in Oughtred's and Brown's, flat compaſſes, or an opening index; and in the ſliding rule no compaſſes at all, the ſlider ſupplying the place of the compaſſes.

Deſcription of GUNTER's *Line.* This line is uſually divided into an hundred parts, every tenth whereof is numbered, beginning with 1, and ending with 10. So that, if the firſt great diviſion 1 repreſent one tenth of any integer or whole number, the next 2 will repreſent 2 tenths; 3, three tenths, &c. and the intermediate diviſions ſo many 100th parts of the ſame integer. Or, if theſe ſubdiviſions repreſent 10 integers, then each of the larger diviſions will repreſent 100, and the whole line will be 1000. In like manner, it may be extended to 10000 by making each ſubdiviſion 100. Hence, it is eaſy to conceive, that any number whatſoever may be found upon the rule, by increaſing or decreaſing the large diviſions, and, conſequently, this ſingle line will repreſent the whole table of logarithms.

Uſe of GUNTER's *Line.*—1. One number being given to be multiplied by another, to find their product.

Suppoſe the numbers given were 8 and 4, to find their product. Extend the compaſſes from 1 to 4, and that extent laid from 8, the ſame way, will reach to 32, the product required. Or, if you work by the ſliding-rule, ſet 1, at the beginning of the ſliding-piece, againſt 4 on the upper or fixed piece; and againſt 4 on the ſlider ſtands 32, on the upper or fixed piece; which is the product required. Whence it is abundantly evident, that the ſliding-piece performs the office of the compaſſes, and therefore, when the method of ſolving any problem by the compaſſes is underſtood, there will be no difficulty of ſolving the ſame by the ſliding-rule.

2. One number being given to be divided by another, to find the quotient.—Suppoſe it were required to divide 64 by 4. Extend the compaſſes from 4 to 1, and the ſame extent, laid the ſame way, will reach from 64 to 16, the quotient required.

3. Three numbers being given to find a fourth in direct proportion.—Let the numbers given be 7, 22, and 14. Extend the compaſſes from 7 to 22, which extent, laid the ſame way, will reach from 14 to 44, the fourth proportional required.

4. To find a mean proportional between 2 given numbers.—Biſſect the diſtance between the two given numbers, and the point of biſſection will fall on the proportional ſought. Thus, if the numbers given be 32 and 8, the middle point between them will be 16, which is the mean proportional required.

5. To extract the ſquare root of any number.—Biſſect the diſtance between 1 on the line, and the point repreſenting the given number; the half whereof being laid from one will give the root required. Thus the ſquare root of 9 will be found to be 3, of 81, 9, &c. The reaſon of theſe operations will be eaſily conceived, by conſidering the nature of logarithms; for, as we have already obſerved, this line is no other than a projection of the table of logarithms, and, conſequently, whatever is ſaid of the latter may juſtly be applied to the former. See LOGARITHMS.

GUNTER's-QUADRANT, one made of wood, braſs, &c. containing a kind of ſtereographic projection of the ſphere on the plane of the equinoctial, the eye being ſuppoſed placed in one of the poles.

Beſides the uſe of this quadrant in finding heights and diſtances, it ſerves alſo to find the hour of the day, the ſun's azimuth, and other problems of the globe. See the article *Gunter's* QUADRANT.

GUNTER's SCALE, called by navigators ſimply the Gunter, is a large ſcale, generally two feet long, and about an inch and a half broad, with artificial lines delineated on it, of great uſe in ſolving queſtions in trigonometry, navigation, &c.

The line of numbers on theſe ſcales conſiſts of two equal lengths, commonly called two radii; the firſt containing the logarithms of numbers from 10 to 100; and in the ſecond are inſerted thoſe between 100 and 1000, or ſuch of them as can conveniently be introduced.

Theſe diviſions are taken from a ſcale of equal parts; ſuch, that 100 make the length of one radius; and from this ſcale the diviſions for the ſines, tangents, and verſed ſines, are alſo taken. Now, from this conſtruction of the line of numbers, it is plain, that, as the numbers in one radius exceed thoſe in the other, by one place in the ſcale of numeration, therefore the differences of their indices muſt alſo be unity: ſo that ſuch numbers only, whoſe index differs by 1, can be eſtimated in a length of two radii; but in a length of three radii, numbers, whoſe indices differ by 2, may be read; and a difference of 3 may be reckoned in a length of 4 radii, &c. The tables of logarithmic ſines, tangents, ſecants, and verſed ſines, are generally computed for a circle, whoſe radius is 10,000,000: therefore,

	°	′	″		°	′	″
In the ſines, the index 9 belongs to all between	90	0	0	and	5	44	36
The index 8	5	44	36	and	0	34	23
The index 7 to all bet.	0	34	23	and	0	3	27
6	0	3	27	and	0	0	21 &c.

	°	′		°	′	″
In the tangents, the index 9 belongs to all between	45	0	and	5	42	10

And the indices, 8, 7, 6, &c. fall as in the ſines.

	°	′		°	′
In the verſed ſines, the index 10 belongs to all between	180	0	and	90	0
9 belongs to all between	90	0	and	25	51
8	25	51	and	8	7
7	8	7	and	2	34
6	2	4	and	0	45 &c.

Now, as the length of the Gunter's ſcale admits of no more than two radii, or of ſuch numbers only, whoſe index differs by unity; therefore, within this length, no more of the ſines, tangents, or verſed ſines, can be introduced, than thoſe whoſe index differs by unity: and as not only the greateſt number among the ſines and tangents, but alſo thoſe more generally wanted, have the indices 9 and 8 differing by unity; therefore all the ſines from 90° to 0° 34′, and all the tangents from 45° to 0° 34′, are thoſe only, which are put on theſe ſcales; the diviſions anſwering to the leſſer ſines and tangents being omitted for want of room. And this is the reaſon why the ſine of 90°, and the tangent of 45°, are limited by the ſame termination as the ſecond radius on the line of numbers.

To conſtruct the Line of logarithmic Sines on GUNTER's *Scale.*—From the ſcale of equal parts, take the numbers expreſſing the arithmetical complements of the log-ſines of the ſucceſſive degrees, and parts of degrees intended to be put on the ſcale, deſcending orderly from 90°; then theſe diſtances, ſucceſſively laid from the mark repreſenting 90° at the right-hand end of the ſcale, will give the ſeveral diviſions of a ſcale of logarithmic ſines.

For the ends of any ſcale being aſſigned, the progreſſive diviſions of that ſcale are laid thereon from that end which repreſents the beginning of the progreſſion; or the ſame diviſions may be laid from the other end, by taking the complements of the terms to the whole length of the ſcale.

Conſequently the arithmetical complements of the ſines are to be laid from the diviſion repreſenting 90 degrees.

To conſtruct the Line of logarithmic Tangents on GUNTER's *Scale.*—Theſe are laid down in the ſame manner, and for the ſame reaſons, that the ſines were; the tangent of 45° ſtanding againſt the ſine of 90°.

The diviſions for the tangents above 45° are reckoned on the ſame line from 45° towards the left-hand; or any tangent and its co-tangent are expreſſed by the ſame diviſion.

Thus one mark ſerves for 40° and 50°, and the diviſion at 30° ſerves alſo for 60°; that at 20° ſerves for 70°, &c. and the like is to be underſtood for the intermediate diviſions.

For as the tangent of an arc is to a radius;
So is radius to the co-tangent of that arc.

Therefore the tangent is equal to the ſquare of radius divided by the co-tangent.

And the co-tangent is equal to the ſquare of radius divided by the tangent.

Now, the radius being unity, its ſquare is alſo unity.

Therefore the tangent and co-tangent of any arc are the reciprocals one of the other.

But the reciprocals of numbers are correlatives to the arithmetical complements of their logarithms.

Therefore the logarithms of a tangent and its co-tangent are arithmetical complements one of the other, and conſequently will fall at equal diſtances from 45 degrees.

Therefore, in the line of logarithmic tangents, the diviſions to degrees under 45 ſerve alſo for thoſe above, both being equally diſtant from 45 degrees.

To conſtruct the Line of logarithmic verſed Sines on GUNTER'*s Scale.*—As the greateſt number of degrees will fall within the limits of the ſcale by beginning at 18°, therefore the termination of this line is at 18°, which is put againſt 90° on the ſines: and although the numbers annexed to the diviſions increaſe in the order from right to left, yet they are only the ſupplements of the verſed ſines themſelves.

Now ſubtract the logarithmic verſed ſines of ſuch degrees and parts of degrees as are intended to be put on the ſcale, from the logarithm verſed ſine of 180°; then the remainder taken from the aforeſaid ſcale of equal parts, and laid ſucceſſively from the termination of this line, will give the ſeveral diviſions ſought.

The following Table to every 10 degrees was conſtructed in the foregoing manner, and are the numbers to be taken from the ſcale of equal parts, for the degrees they ſtand againſt.

Deg.	Supplements of VerſedSines.	Deg.	Supplements of VerſedSines.	Deg.	Supplements of VerſedSines.
180	0,00000	120	0,12494	60	0,60206
170	0,00331	110	0,17327	50	0,74810
160	0,01330	100	0,23149	40	0,93190
150	0,03011	90	0,30103	30	1,17401
140	0,05402	80	0,38387	20	1,52066
130	0,08545	70	0,48282	10	2,21941

From this table it appears, that the leaſt verſed ſine which can be introduced within the length of a double radius, falls between 10° and 20°, where the index changes from 1 to 2; which will happen about 11° 28′.

If a table of logarithm verſed ſines to 180° are wanting, they are eaſily made by the following rule:

"Take the logarithm ſine of 30 degrees from twice the logarithm ſine of (N) any number of degrees, the remainder is the logarithm verſed ſine of (2 N, or) twice thoſe degrees."

For it is a well known geometrical property, that the ſine of any arc (A) is a mean proportional between radius (R) and half the verſed ſine of twice that arc.

Therefore, putting v for the verſed ſine, and s for the ſine;

The $v\,2\,A = \left(\frac{2\,s\,s\,A}{R} = s\,s\,A \times - \frac{2}{R} = s\,s\,A \times \frac{2}{10} = \right) s\,s\,A \times \frac{1}{5}$; radius being 10.

Or the log. $v\,2\,A = 2$ log. s A — log. 5.

But, when radius is 10, the ſine of 30° is 5.

Therefore the log. $v\,2\,A = 2$ log. s A — log. ſine of 30°.

Moſt of the writers on this ſubject give the following rule for laying down the diviſions of this line:

"From the line of logarithmic ſines, take the diſtance between 90° and any arc; that diſtance being twice repeated, from the termination of the line of verſed ſines, will give the diviſion for twice the complement of that arc."

Thus the diſtance between 90° and 20° on the ſines twice repeated, gives the verſed ſine of 140°; or twice 70°, the complement of 20°. For the diviſions to be laid on this line, are the differences between the logarithm verſed ſine of 180°, and the logarithm verſed ſines of the ſucceſſive arcs.

Now the difference between the logarithm verſed ſines of 180°, and of any arc 2 A, is log. ver. ſine 180 — 2 log. ſin. A + log. ſin. of 30°.

Or, 10,30103 + 9,69897 — twice the log. ſin. of A.

Or, 20,00000 — twice logarithm ſine of A.

Or the arithmetical complement of twice log. ſine of A.

That is, the difference between the logarithm verſed ſine of 180°, and the logarithm verſed ſine of any arc, is equal to double the arithmetical complement of the logarithm ſine of half that arc, rejecting the indices.

But as the differences give the diviſions to the ſupplements of the real verſed ſines, therefore the arithmetical complement of the logarithm ſine of any arc, being doubled, will give the diſtance of the diviſion for the ſupplement of twice that arc on the line of verſed ſines.

Thus, for 70°, the logarithm ſine is 9,97299.

The arithmetical complement is 0,02701.

Its double is 0,05402.

Which is the number in the foregoing table ſtanding againſt 140°, and is the ſupplement verſed ſine of twice 70°.

Now, as the arithmetical complement of the log. ſines of arcs are the diſtances on the line of ſines between 90°, and the diviſions to thoſe arcs; therefore the diſtances between 90 degrees and any arc, being twice repeated, will give the diviſion of the ſupplemental verſed ſine to twice the co-ſine of that arc. *Phil. Tranſ.* Vol. XLIX.

GURNARD, in ichthyology, the Engliſh name of two ſpecies of trigla.

Theſe fiſhes, from their different colours, are called the grey and red gurnard. The grey gurnard has a bifid and ſpinoſe ſnout, with two ſpines at each eye. The red kind has likewiſe the roſtrum bifid, and the covering of the gills ſtriated, and each of them armed with three ſpines. This laſt is a very remarkable ſpinoſe fiſh, which ſeldom exceeds a foot in length.

Both theſe fiſhes make a ſingular noiſe, when out of the water, not unlike the grunting of a hog; whence their Engliſh name.

GUSSET, in heraldry, is formed by a line drawn from the dexter or ſiniſter chief points, and falling down perpendicularly to the extreme baſe.

GUTTÆ, in architecture, are ornaments in form of little cones, in the platform of the Doric corniche, or architrave, underneath the triglyphs, repreſenting a ſort of drops or bells, uſually ſix in number. They are ſometimes called lachrymæ, campanæ, or campanulæ.

GUTTÆ *Roſacea*, in medicine, denotes a red or pimpled face; a diſtemper which, though not always owing its original to hard drinking, is nevertheleſs moſt incident to tipplers of ſtrong beer, wines, ſpirits, &c.

As to the cure, beſides making a revulſion by bleeding, bliſtering, cupping, iſſues, &c. the diet ought to be moiſtening and cooling, as lettuce, purſlain, ſorrel, and ſpinach: the drink may be an emulſion of the cold ſeeds, milk and water, clarified whey, &c.

GUTTÆ *Serena*, barbarouſly ſo called by the Latin writers of the lower ages, which the Greeks term αμαρυωσις, in medicine, is a total blindneſs in the principal parts of the immediate organ of viſion, the eye ſtill continuing clear and ſeemingly unaffected.

GUTTERS, in architecture, a kind of canals in the roofs of houſes, ſerving to receive and carry off the rain.

Gutters, with reſpect to their poſition, are of two kinds: ſuch as come ſomething near a paralleliſm with the horizon; and ſuch as incline towards a vertical poſition to the horizon.

GUTTURAL, a term applied to letters or ſounds pronounced or formed as it were in the throat. There are four guttural letters in the Hebrew, viz. אהחע, which, for memory's ſake, are termed ahachah. See LETTER.

GUTTY, *Gutté*, in heraldry, a term uſed when any thing is changed or ſprinkled with drops.

In blazoning, the colour of the drops is to be named, as gutty of ſable, of gules, &c.

GUY, in naval affairs, a rope uſed to keep ſteady any weighty body which is hoiſted into, or lowered out of, a ſhip, or to prevent any thing from being ſhaken at ſea by the agitation of the ſhip on the waves.

GUZES, in heraldry, roundles of a ſanguine or murry colour. Theſe, from their bloody hue, are ſuppoſed to repreſent wounds.

GYMNASIARCH, *Gymnaſiarcha*, in antiquity, the maſter of a gymnaſium or place of exerciſe.

The word is Greek, γυμνασιαρχης, and derived from γυμνασιον, a place of exerciſe, and αρχων, a head or maſter.

This office was of great importance, as all the youth were truſted to this maſter's care to be formed to exerciſes of the body. He had three officers under him: the xyſtarch, who was maſter of the athletæ or wreſtlers: the gymnaſtra, who had the direction of all the other exerciſes; as that they ſhould be performed in due time and properly; that the youth attempted nothing beyond their ſtrength, or injurious to their health: and the pædotriba, who taught the exerciſes mechanically, without underſtanding their theory.

Under theſe were ſeveral ſubalterns or ſervants for the inſtruction of the youth.

GYMNASIUM, the place where the above exerciſes were performed, being a public edifice, under proper maſters.

The word is Greek, γυμνασιον, and is derived from γυμνος, naked, as they put off their cloaths, the better to perform their exerciſes.

GYMNASTICS, the art of performing the ſeveral bodily exerciſes, as wreſtling, running, fencing, dancing, &c. See the article WRESTLING, &c.

The part of medicine which regulates the exerciſes of the body, whether for preſerving or reſtoring health, is alſo termed gymnaſtic.

GYMNOSOPHISTS, a ſect of philoſophers who cloathed themſelves no farther than modeſty required. There were ſome of theſe ſages in Africa; but the moſt celebrated clan of them was in India. The African gymnoſophiſts dwelt upon a mountain in Ethiopia, near the Nile, without the accommodation either of houſe or cell. They did not form themſelves into ſocieties like thoſe of India, but each had his private retirement, where he ſtudied and performed his devotions by himſelf. If any perſon had killed another by chance, he applied to theſe ſages for abſolution, and ſubmitted to whatever penances they enjoined. They obſerved an extraordinary frugality, and lived only upon the fruits of the earth. Lucan aſcribes to theſe gymnoſophiſts ſeveral new diſcoveries in aſtronomy.

GYMNOSPERMIA, an order or diviſion of the didynamia claſs of plants in the Linnæan ſyſtem of botany, comprehending all thoſe plants of that claſs whoſe flowers are deſtitute of a pericarpium or capſule; the ſeeds being lodged in the baſe of the cup. The plants of this order are ſcented, and are accounted cephalic and reſolvent, the virtue being principally contained in the leaves; it includes thoſe plants with labiated flowers, ſuch as mint, thyme, betony, &c.

GYNÆCEUM, among the ancients, the apartment of the women, a ſeparate room in the inner part of the houſe, where they employed themſelves in ſpinning, weaving, and needle-work.

GYNANDRIA, from γυνη, female, and ανηρ, male, the name of the twentieth claſs of plants in the Linnæan ſyſtem of botany, comprehending all thoſe whoſe ſtamina grow either on the piſtillum or upon a receptacle elongated into the form of a ſtyle, and carrying on it both the ſtamina and piſtil. All the flowers of this claſs have a monſtrous appearance, owing to the uncommon ſituation of the parts of fructification, as the arum, dracontium, birthwort, paſſion-flower, &c.

GYPSOPHILA, in botany, a genus of plants whoſe flower contains five oval obtuſe ſpreading petals, with ten ſubulated filaments topped with roundiſh antheræ. The fruit is a globoſe unilocular capſule, opening with five valves, and filled with a number of roundiſh ſmall ſeeds.

GYPSUM, or Plaster-Stone, in natural hiſtory, a genus of foſſils naturally and eſſentially ſimple, not inflammable nor ſoluble in water, and compoſed of ſmall flat particles; which form bright, gloſſy, and in ſome degree tranſparent maſſes, not flexible or elaſtic, not giving fire with ſteel, nor fermenting with or being ſoluble in acid menſtrua, and very eaſily calcining by fire.

Of theſe gypſums, ſome are harder, others ſofter; and are of ſeveral colours, as white, grey, red, green, &c. ſometimes diſtinct, and ſometimes variouſly blended together.

The texture of all the gypſums being ultimately the ſame, it may be ſufficient to obſerve, that their origin is plainly from particles of a determinate nature and ſubſtance, and of a certain and invariable figure, an oblong, flat, and irregularly angular one. Theſe we ſometimes ſee, as indeed is moſt natural to them, diſpoſed without order or regularity, into looſe, complex, friable maſſes; at others, they are getting out of their native order, and emulating the ſtructure of other claſſes of bodies, of which they are indeed properly the baſis, and appearing ſomewhat in the figure of the fibrariæ; and at other times, of the foliaceous compoſite flakes of the ſelenitæ: the ſpecies which have theſe ſtructures, are truly varying from the gypſums into thoſe bodies they emulate; for the fibrariæ are only a peculiar arrangement of theſe very particles, and the ſelenitæ only more broad flakes of the ſame, like thoſe of the foliaceous talcs.

The gypſums are much uſed in plaſter, for ſtuccoing rooms, and caſting buſts and ſtatues.

Gypsum Striatum, ſtriated plaſter-ſtone, the whitiſh, leſs gloſſy tricheria, with ſhort thick filaments. See Tricheria.

H.

H, The eighth letter of the Engliſh alphabet, and ſixth conſonant.

It is a conſonant of the guttural kind, as the throat concurs more to its formation than any other of the organs of ſpeech.

Menage diſtinguiſhes two kinds of *h*; the one an aſpirate, which is a conſonant; and the other a mute, which has no peculiar ſound diſtinct from that of the immediately following vowel or diphthong.

When the *h* is preceded by a *c*, both together often ſound like the Hebrew ש, with a point over the right horn, as *charity*, &c.

The *ch* in moſt words derived from the Greek, and expreſſed in that language by χ, is generally ſounded like a *k*, as *echo*, *chorus*, &c. though ſometimes ſoftened, as *Cherſoneſus*.

Ph is pronounced like an *f*; as *phraſes*, *Philiſtines*, *phlegm*, &c. moſt of theſe words being of Greek, or Oriental original, proper names, &c. and wrote in Greek with a φ, and with a פ in the Hebrew.

H in ancient authors we meet with inſtead of *f*; particularly in the Spaniſh, where moſt of the words borrowed from the Latin, beginning with an *f*, take the *h* inſtead of it, as *hablari* for *fabulari*, *haba* for *faba*, &c.

The ſharp accent of the Greeks, which is the ſame with our *h*, is frequently changed for an *s*, as ἅλς, ſal, ἑπτὰ, ſeptem, &c.

Anciently *h* was put for *ch*: thus, of *Chlodovicus* was formed *Hludovicus*, as we find in the coins of the ninth and tenth centuries; in proceſs of time the ſecond of the *h's* being much weakened, the *h* was entirely dropped, and was written *Ludovicus*.

The *h* is ſometimes found prefixed to the *c*, as *Hcarolus*, *hcalendæ*, &c. for *Carolus* and *calendæ*.

H alſo, among the ancients, denotes 200, according to the monkiſh verſe,

H quoque ducentos per ſe deſignat habendos.

When a daſh was added at top, H̄, it ſignified 200,000.

HABBAKUK, or the prophecy of Habbakuk, a canonical book of the Old Teſtament.

There is no mention made in ſcripture, either of the time when this prophet lived, or of the parents from whom he was deſcended; but according to the authors of the Lives of the Prophets, he was of the tribe of Simeon, and a native of Bethzacar. As he foreſaw the taking of Jeruſalem by Nebuchadnezzar, he fled to Oſtracin in Arabia, where he lived for ſome time; but after the Chaldæans had made themſelves maſters of Jeruſalem, and were on their return home, he returned into Judæa, where he employed himſelf in agriculture; but as he was carrying the reapers their dinner, he is ſaid to have been tranſported by an angel to Babylon, with what he had provided for his people in the field; which he ſet before Daniel, who was ſhut up in the lions den, and was tranſported back again to Judæa, where he died, before the end of the captivity.

He is reported to have been the author of ſeveral prophecies which are not extant; but thoſe that are indiſputably his, are contained in three chapters. In theſe the prophet complains very pathetically of the diſorders which he obſerved in the kingdom of Judæa. God reveals to him, that he would ſhortly puniſh them in a very terrible manner by the arms of the Chaldæans. He foretels the conqueſts of Nebuchadnezzar, his metamorphoſis, and death. He predicts, that the vaſt deſigns of Jehoiakim would be fruſtrated. He ſpeaks againſt a prince (probably the king of Tyre) who built with blood and iniquity; and he accuſes another king (perhaps the king of Egypt) of having intoxicated his friend, in order to diſcover his nakedneſs. The third chapter is a ſong or prayer to God, whoſe majeſty he deſcribes with the utmoſt grandeur and ſublimity of expreſſion.

HABDALA, a ceremony of the Jews, obſerved on the ſabbath in the evening, when every one of the family is come home. At that time, they light a taper, or lamp, with two wicks at leaſt: the maſter of the family then takes a cup with ſome wine, mixed with fragrant ſpices; and after having repeated a paſſage or two of ſcripture, as for example, "I will take the cup of ſalvation, &c." Pſal. cxvi. and, "The Jews had light and gladneſs, &c." Eſth. viii. he bleſſes the wine and ſpices. Afterwards he bleſſes the light of the fire, and then caſts his eyes on his hands and nails, as remembering that he is going to work. The whole is intended to ſignify that the ſabbath is over, and is from that moment divided from the day of labour which follows. For this reaſon the ceremony is called habdala, which ſignifies diſtinction.

HABEAS CORPORA, in law, a writ iſſued for bringing in a jury, or ſuch of them as refuſe to appear upon the venire facias, for the trial of a cauſe brought to iſſue.

It commands the ſheriff to have the jurors before the judges on ſuch a day, &c. and is of the ſame nature in the common pleas, as the diſtringas juratories in the court of King's bench.

HABEAS CORPUS, in law, is a writ of two kinds, the one being the great writ of the Engliſh liberty, which lies where a perſon is indicted for any crime or treſpaſs before juſtices of the peace, or in a court of any franchiſe, and on being impriſoned, has offered ſufficient bail, which has been refuſed, though the caſe be bailable; in which caſe he may have this writ out of the King's bench, in order to remove himſelf thither, to anſwer the cauſe at the bar of that court.

The practice in this caſe is firſt to procure a certiorari out of the court of chancery, directed to all the juſtices, for removing the indictment into the King's bench; and upon that to obtain this writ, directed to the ſheriff, for cauſing the body of the party to be brought at a certain day.

The other kind of habeas corpus is uſed for bringing the body of a perſon into court, who is committed to any gaol or priſon, either in criminal or civil cauſes; which writ will remove the perſon and cauſe from one court or priſon to another.

No habeas corpus, or other writ, to remove a cauſe from out of an inferior court, can be allowed, if the ſame be not delivered to the judge of the court, before the jury, who are to try the cauſe, have appeared, and before any of them are ſworn, 43 Eliz. c. 5.

The habeas corpus act (31 Car. II. c. 2.) has ordained, that a perſon may have a habeas corpus from any judge, on complaint made and view of the warrant of commitment (except ſuch perſon is committed for treaſon or felony, expreſſed in the warrant, or ſome other offence that is not bailable) which habeas corpus muſt be made returnable immediately; and on producing a certificate of the cauſe of commitment, the priſoner is to be diſcharged, on bail given to appear in the court of King's-bench the next term, or next aſſizes, &c.

Perſons committed for either treaſon or felony, expreſsly mentioned in the warrant, upon a motion made in open court, in the firſt week of the term, or day of ſeſſions, &c. after commitment, are to be brought to trial; and if they are not indicted the next term or ſeſſions after commitment, on a motion made the laſt day of that term, they ſhall be let out upon bail, except it appear on oath that the king's witneſſes are not ready; and in caſe they are not indicted, or tried, the ſecond term after commitment, they ſhall be diſcharged.

Judges denying a habeas corpus, ſhall forfeit 500*l.* and if an officer refuſe to obey it, or to deliver a true copy of the commitment-warrant, he forfeits 100*l.* for the firſt offence.

Habeas Corpus ad Prosequendum, a writ for the removal of a perſon in order to proſecution and trial in the proper county.

Habeas Corpus ad Faciendum et Recipiendum, a writ iſſued out of the court of Common-pleas, on behalf of defendants ſued in inferior courts, to remove their cauſe into the ſaid court.

Habeas Corpus ad Respondendum, a writ that lies where a perſon is impriſoned at another's ſuit, in any priſon except that of the King's-bench, and a third perſon would ſue the priſoner there; in which caſe, this writ will remove ſuch perſon from the priſon where he is, into the King's-bench, to anſwer the action in that court.

Habeas Corpus ad Satisfaciendum, a writ that lies againſt a perſon in the Fleet-priſon, &c. to charge him in execution. The delivery of this writ to the warden is ſufficient.

HABENDUM, in law, a term ſignifying to have and to hold.

A deed or conveyance has two principal parts; the premiſes and the habendum. The office of the firſt is, to expreſs the names of the grantor, the grantee, and the things granted: that of the habendum, to ſhew what eſtate or intereſt the grantee is to have in what is granted. According to lord Coke, the habendum is to limit the eſtate, ſo that the general implication, which, by conſtruction of law, paſſes in the premiſes, is by the habendum controlled and qualified. Thus, in a leaſe to two perſons, to have and to hold to the one for life, alters the implication of the joint-tenancy in the freehold, which would paſs by the premiſes, were it not for the habendum.

HABERDASHER, in commerce, a ſeller of hats, or ſmall wares.

HABERE Facias Possessionem, a writ that lies where one has recovered a term for years in an action of ejectment, in order to put him into poſſeſſion again.

Habere Facias Seisinam, a writ that lies where a perſon has recovered land in the king's court, directed to the ſheriff, commanding him to give ſeiſin of the land recovered.

Habere Facias Visum, is a writ that lies in divers caſes, as in dower, formedon, &c. where it is neceſſary to take a view of the lands or tenements in queſtion.

HABERGION, a ſmall coat of mail, or only ſleeves and gorget of mail, formed of little iron rings, or maſhes linked into each other. See the article Gorget.

HABILIMENTS *of War*, in our ancient ſtatutes, ſignify armour, harneſs, utenſils, or other proviſions for war, without which there is ſuppoſed no ability to maintain war.

HABIT, in philoſophy, an aptitude or diſpoſition either of mind or body, acquired by a frequent repetition of the ſame act.

Habit, in medicine, denotes the ſettled conſtitution of the body, or the habitude of any thing elſe, as the ſtructure or compoſition of a body, or the parts thereof.

Habit is alſo uſed for a dreſs or garb, or the compoſition of garments, wherewith a perſon is covered; in which ſenſe we ſay, the habit of an eccleſiaſtic, of a religious, &c. a military habit, &c.

HABITUDE, among ſchoolmen, the reſpect or relation one thing bears to another. See the article Relation.

Habitude is alſo uſed by philoſophers for what we commonly call habit, or a certain diſpoſition or habitude for the performing or ſuffering certain things, acquired by repeated acts of the ſame kind.

HADDOCK, the Engliſh name of a well known fiſh of the gadus kind, with a bearded mouth, and three fins on the back: its body is whitiſh, the upper jaw longeſt, and the tail a little forked.

HADE, among miners, ſignifies the ſteep deſcent of a ſhaft, or the like paſſage.

HÆMANTHUS, blood-flower, in botany, a genus of plants whoſe flower is monopetalous, erect, and divided into ſix linear ſegments, having a very ſhort angular tube, in which is inſerted ſix ſubulated filaments, topped with oblong incumbent antheræ. The fruit is a roundiſh trilocular berry, containing three triquetrous ſeeds.

The flowers grow in cluſters, and are of a beautiful red colour. This genus includes the dracunculoides of Boerhaave.

HÆMATITES, in natural hiſtory, the bloodſtone, a kind of mineral, ſo called on account of its reſembling curdled blood, or from its quality of ſtopping blood.

The word is Greek, αιματιτης, and is derived from αιμα, blood.

HÆMATOXYLUM, logwood-tree, in botany. It grows naturally in the bay of Campeachy, Honduras, and other parts of the Spaniſh Weſt-Indies; it riſes to the height of eighteen or twenty feet, and is generally crooked and deformed; the branches are irregular, armed with ſtrong thorns, and furniſhed with winged leaves compoſed of three or four pair of lobes, which are obtuſe and indented. The flowers come in a racemus from the wings of the leaves; they are of a pale yellow colour, each containing five equal and ovated petals, with ten ſubulated ſtamina. The fruit is a lanceolated, obtuſe, and unilocular capſule, opening with two valves, and contains a few, compreſſed, oblong ſeeds.

For the uſes of logwood, ſee the article *Campeachy* Wood.

HÆMOPTOSIS, in medicine, a ſpitting of blood, occaſioned by the rupture or eroſion of ſome veſſel in the lungs, commonly attended with a cough and preſſure on the thorax.

The word is Greek, αιμοπτυσις, and is derived from αιμα, blood, and ϖτυω, to ſpit.

HÆMORRHAGE, *Hæmorrhagia*, in medicine, an eruption of the blood from any part of the body.

The word is Greek, αιμορραγια, and derived from αιμα, blood, and ρηγνυμι, to burſt.

HÆMORRHOIDAL; the veins and arteries of the rectum and fundament are ſo denominated, as being the ſeat of the hæmorrhoids.

HÆMORRHOIDS, *Hæmorrhoides*, the piles, or a diſcharge of blood from the hæmorrhoidal veins about the anus and rectum.

The word is Greek, αιμορροις, ſignifying the ſame thing, and derived from αιμα, blood, and ρεω, to flow.

Every liberal diſcharge of blood from the veins of the anus, is not to be accounted exceſſive and preternatural; but in order to form an eſtimate of this circumſtance, we are carefully to conſider the veſſels, the habit of body, the ſtrength, the age, and the conſtitution of the patient; for it frequently happens, that the diſcharge of a certain quantity of blood proves ſalutary and beneficial to ſome; whereas the evacuation of an equal quantity proves hurtful and injurious to others: nor is every hæmorrhoidal diſcharge, though larger than uſual, and excited by the increaſed quantity and commotion of the blood, to be eſteemed a diſeaſe; but only ſuch a diſcharge as continues long, impairs the ſtrength, deſtroys the appetite, the due digeſtion of the aliments, nutrition, and the other functions of the body, and conſequently lays a foundation for violent chronical diſorders.

Every evacuation of blood from the inteſtinum rectum is ſupplied from the hæmorrhoidal veſſels; but the external hæmorrhoidal veſſels rarely flow profuſely, but readily degenerate into painful varices, which, when opened, diſcharge blood, though ſeldom in large quantities. But the internal hæmorrhoidal veſſels, which are ramifications of the ſplenic branch, and are diſtributed to the interior ſubſtance of the inteſtinum rectum, and the ſphincter ani, together with the ſmall arteries ariſing from the inferior meſeraic veſſels, not only diſcharge a large quantity, but, when ſuppreſſed, generate thoſe diſeaſes which ariſe from diſorders of the liver, ſpleen, pancreas, meſentery, and inteſtines.

It is uſually agreed, that this ſalutary evacuation from the veins of the anus, is owing to a difficult circulation of the blood through the hæmorrhoidal veins, in conſequence of their perpendicular ſituation, and its difficult return to the vena portæ and the liver; and that the diſcharge actually happens when the extremities of the veſſels, in the inteſtinum rectum, are ſo diſtended by the blood accumulated in them, as at laſt to be ruptured.

The cure.—As this diſorder may proceed from various cauſes, ſo there muſt be various intentions of cure purſued, and different remedies made choice of.

It frequently happens, that when, in plethoric bodies, the hæmorrhoidal diſcharge, uſual at other times, is for ſome time ſtopped, it not only appears again ſuddenly upon any violent commotion either of body or mind, the liberal uſe of ſpirituous liquors, too hot baths, or upon taking medicines increaſing the inteſtine motion of blood, but continues long, and is attended with a large and ſtrong pulſe. When this is the caſe, the firſt ſtep to be taken is to divert the impetus of the blood; for this purpoſe veneſection in the arm, or an immerſion of the arms in a tepid mixture of water and wine, are of ſingular ſervice: then we are to uſe ſuch things as check the exceſſive inteſtine motion of the ſulphureous parts of the blood, eſpecially things of a diluting and refrigerating nature, ſuch as drinking cold water, eſpecially of the chalybeate kind, tincture of roſes prepared with ſpirit of vitriol, a decoction of hartſhorn, mixed with citron or lemon juice. When, together with a loſs of ſtrength, and an injured ſtate of the nobler functions, a large hemorrhoidal diſcharge continues for a long time, and the viſcera begin to be tainted, whilſt, at the ſame time, the blood is rather aqueous and ſerous than fibrous, and of a due conſiſtence; thoſe medicines are highly beneficial which gradually and mildly carry off, by ſtool, the peccant bilious juices, and, at the ſame time, invite the humours from the inteſtinum rectum, to the coats and glands of the other inteſtines. The moſt efficacious of theſe are the preparations of rhubarb, with currants and tamarinds; or, if the body is bilious, with cream of tartar, exhibited in a potion rendered agreeable by an eleoſaccharum, prepared with the oil of citron.

In that more obſtinate and difficultly cured ſpecies of this diſorder, which ariſes from an obſtruction, an infarction, or increaſed bulk, of any of the viſcera; ſuch as the liver, ſpleen, and, in women, the uterus: if there is ſtill any place for the means of relief, ſuch medicines are to be choſen as reſolve the obſtructions without throwing the humours into too violent a commotion.

Among the principal cauſes of a too copious hæmorrhoidal diſcharge, we may juſtly reckon a want of due tone in the inteſtinum rectum, together with its component membranes and veſſels: for this reaſon, ſuch medicines are alſo to be uſed as reſtore the ſtrength of parts too much weakened and relaxed; as the extracts of caſcarilla and red ſaunders.

In order to obtain the deſigned effect, external applications of an aſtringent nature are alſo to be uſed; ſuch as the decoction of balauſtine flowers, red-roſes, myrrh, and the Peruvian bark.

In the cure of violent hæmorrhoidal diſcharges, veneſection is to be premiſed, and the primæ viæ cleanſed, either with recent caſſia, or the beſt rhubarb, exhibited in a decoction: then both internal and external medicines, of a corroborative and gently aſtringent nature, may be ſafely uſed.

When a ſudden ſtoppage of the hæmorrhoidal diſcharge is ſucceeded by an uneaſineſs of the præcordia, inflations, reſtleſſneſs, and difficulty of breathing, it is to be recalled by mild laxatives, emollient clyſters, and ſuppoſitories.

In no diſeaſe is an accurate and cautious regimen more neceſſary than in this, ſince, in conſequence of a neglect in this particular, the moſt efficacious remedies will not produce their deſired effect.

When the diſorder is once removed, due pains are to be taken in order to prevent its return. This intention is moſt commodiouſly and effectually anſwered by veneſection three or four times inſtituted every year; by cleanſing the primæ viæ once a month, and by the prudent uſe of mineral waters, or only of chalybeated milk; and, laſtly, all ſuch aliments and laxatives as excite pain, are carefully to be abſtained from.

HAGAI, a canonical book of the Old Teſtament, ſo called from the prophet of that name, who, in all probability, was born at Babylon, from whence he returned with Zerubbabel.

This prophet, by the command of God, exhorted the Jews, after their return from their captivity, to finiſh the rebuilding of the temple, which they had intermitted for fourteen years. His remonſtrances had the deſired effect; and to encourage them to proceed in the work, he aſſured them from God, that the glory of this latter houſe ſhould be greater than the glory of the former: which was accordingly fulfilled, when Chriſt honoured it with his preſence: for, with reſpect to the building, this latter temple was nothing in compariſon of the former.

HAGGARD FALCON, the greeniſh legged falcon, with a livid back. It is a large ſpecies, equal to a full grown hen in ſize. See the article FALCON.

HAGIOGRAPHA, or holy writings, a name given to a particular diviſion of the Old Teſtament, as containing hymns to God, and moral precepts for the conduct of life. The books diſtinguiſhed by this term were the Pſalms, Proverbs, Eccleſiaſtes, and the Song of Solomon.

HAIL, *Grando*, in phyſiology, a watery concretion in the form of pellucid white globules, that fall from the air.

It is thought to be drops of rain frozen in their paſſage through the middle region: or according to the Carteſians, the fragments of a frozen cloud, half melted; precipitated and congealed again.

Hail is of various figures, according to the degrees of heat or cold of the air through which the liquified clouds paſs. It frequently attends thunder and lightning; the nitre that contributes to the one, having alſo a large ſhare in the production of the other.

HAIR, *Crinis* or *Capellus*, a ſort of tegument for the greateſt part of animals. It is found on all parts of the human body, except the ſoles of the feet and palms of the hands.

Hair properly lives and receives nutriment to diſtend it like the other parts of the body; however, this growth is is of a different kind from that of the reſt of the body, and is not immediately derived therefrom, nor reciprocated therewith. It grows like plants out of the earth, or as ſome plants ſhoot from the parts of others; from which, though they draw the nutriment, each has its diſtinct life and œconomy.

Hairs are obſerved by the microſcope to be hollow, and furniſhed with a multitude of veſſels; and, however they appear ſmooth to the naked eye, the microſcope ſhews them knotted like ſome ſorts of graſs, and to ſend out branches from their joints.

The branching of the hair is pretty viſible at the extremities by the help of a microſcope; for it is very apt to ſplit, eſpecially if worn too long, or kept too dry; and by the ſame means it appears like a bruſh.

Each hair has a little bulbous or oval root in the ſkin, which is ſometimes plucked away with it. The hair is commonly reputed an excrement, and whatever the nature of its nouriſhment be, it ſeems to be more ſimple than the other humours of the body. For long after death, when all the other parts and humours are corrupted, the hair will vegetate.

The ſize of hair depends on the magnitude of the pores they iſſue from; if thoſe be ſmall, theſe are fine; if thoſe be oblong or ſinous, the hair is curled. Their length depends on the quantity of the proper humour to feed them; and their colour on the quality of that humour; whence at different periods of life the colour uſually differs.

HAIR'S-BREADTH, a meaſure of length, being the forty-eighth part of an inch.

HAKE, in ichthyology, the Engliſh name of the gadus, with two fins on the back, and the under jaw longeſt. It grows to two feet or more in length, but is the ſlendereſt of all the gadi.

HALBARD, or HALBERT, in the art of war,

a well known weapon, carried by the ſerjeants of foot and dragoons.

HALBERT, among farriers, is a ſmall piece of iron an inch broad, and three or four inches long, ſoldered to the toe of a horſe's ſhoe, to hinder a lame horſe from treading on his toe.

Theſe halbert-ſhoes neceſſarily conſtrain a lame horſe, when he goes at a moderate pace, to tread or reſt on his heel, which lengthens and draws out the back ſinew, that was before in ſome meaſure ſhrunk.

HALCYON, in ornithology, a name given by the ancients to the iſpida, or king-fiſher. See the article KING-FISHER.

HALCYON-DAYS, *Dies halcyonii*, in antiquity, a name given to ſeven days before and as many after the winter ſolſtice; by reaſon the halcyon, invited by the calmneſs of the weather, laid its eggs in neſts built on the rocks, cloſe by the brink of the ſea, at this ſeaſon.

HALESIA, in botany, a genus of plants, whoſe flower conſiſts of a monopetalous ventricoſe bell-ſhaped corolla, with ten ſubulated erect filaments, topped with oblong obtuſe antheræ. The fruit is a corticated oblong bilocular nut, containing two ſeeds.

HALLERIA, in botany, a genus of didynamious plants, whoſe flower is monopetalous and ringent. The fruit is a roundiſh berry, with two cells, each containing one hard ſeed.

HALF-BLOOD, in law, is where a man marries a ſecond wife, the firſt being dead, and by the firſt venter has a ſon, and by his ſecond venter has likewiſe a ſon, the two brothers in this caſe are but of half blood; they being iſſue by different venters; and on that account, lands in fee cannot deſcend from one to the other; except in caſe of crown-lands, dignities, or eſtates tail. But half-blood is no impediment to an adminiſtration, which may be granted to that as well as to the whole blood, of the effects of an inteſtate; and the half-blood ſhall come in for a ſhare of his perſonal eſtate, equally with the whole blood, as the brothers by different venters are next of kin in equal degree. 22 Car. II. c. 10.

HALF-MOON, *Demi-Lune*, in fortification, a work which is commonly made before the curtain or flanked angle of the baſtion: the former generally conſiſts of two little flanks and two faces, which terminate in a ſaliant angle towards the fields; the gorge of the demi-lune is terminated by two lines continued from the counterſcarpe of the foſſe, that form an entering angle towards the place, about the middle of the curtain. The demi-lune on the flanked angle of the baſtion differs only from the former, in that it is formed by a circular line; and hence it takes its name demi-lune.

The moderns make uſe of good counterguards to cover the baſtions inſtead of the demi-lunes.

They call a demi-lune what was formerly denominated a ravelin, only that this laſt work has no flanks, and has two faces terminating in a ſaliant angle towards the field.

A demi-lune is ſaid to be crowned when it is covered by a crowned work: it is in like manner ſaid to be a tenaille, when on the right and left it has two works conſtructed in a right angle on the flanked angle of the demi-lune, by the prolongation of its two faces, between twenty-eight and thirty fathoms; each of theſe works having two faces terminating in a ſaliant angle towards the field, and a ditch of nine fathoms that ſeparates them from the demi-lune and counterſcarpe.

Laſtly, a demi-lune is called a horn-work, when it is counter-guarded by two works that advance in form of a horn towards the country, having before it a little demi-lune, or lunette, that covers the intermediate ſpace betwixt them, and conſequently the flanked angle of the demi-lune.

HALF-SEAL, that uſed in the court of chancery for ſealing commiſſions to delegates, upon any appeal, in eccleſiaſtical or marine cauſes.

HALF-TANGENTS. See the articles TANGENT and SCALE.

HALIARDS, in the marine language, the ropes or tackles by which the ſails are hoiſted up along the maſts or ſtays of the ſhip.

HALL, in architecture, a large room at the entrance of a fine houſe and palace. Vitruvius mentions three kinds of halls; the Tetraſtyle, with four columns, ſupporting the platform or ceiling; the Corinthian, with columns all round let into the wall, and vaulted over; and the Egyptian, which had a periſtyle of inſolated Corinthian columns, bearing a ſecond order with a ceiling.

HALL, in old writers, is alſo uſed for a manſion-houſe; and to this day, in many parts of the kingdom, gentlemen's ſeats are called halls.

HALLAGE, a fee or toll paid for cloth brought to be ſold in Blackwell-hall, London.

HALLELUJA, a word ſignifying, praiſe the Lord.

The ſinging halleluja was a ſort of invitatory, or call to each other, to praiſe the Lord.

HALO, in phyſiology, a meteor, in form of a luminous ring, or circle, of various colours, appearing round the bodies of the ſun, moon, or ſtars.

The word is formed of the Greek αλως, or αλων, area.

That around the moon is the moſt uſual, and is called *corona*, crown.

Naturaliſts conceive the halo to ariſe from a refraction of the rays of light in their paſſing through the fine rare veſiculæ of a thin nubicula, or vapour, towards the top of our atmoſphere; which account they confirm hence, that a quantity of water being thrown up againſt the ſun, as it breaks and diſperſes into drops, it forms a kind of halo, or iris, exhibiting the colours of the natural rainbow.

M. Huygens ſuppoſes halos, or circles round the ſun, to be formed by ſmall round grains of a kind of hail, made up of two different parts, one of which is opake, and incloſed in the other, which is tranſparent; which is the general ſtructure obſerved in hail.

After the ſame manner he accounts for the parhelia; only that he imagines the icy grains of an oblong figure, and rounding at the ends, like cylinders with round convex tops. Where ſome of theſe cylinders are in an erect poſition, the circle they form will be white, by reaſon of the reflection of the rays of the ſun on the ſurface of theſe cylinders. He proceeds to account for the coloured halos and parhelia, from the ſame hypotheſis; and produces an experiment of a glaſs cylinder, a foot long, having within it an opake kernel (which was a cylinder of wood), and the ambient ſpace filled with water; this cylinder, being expoſed to the ſun, and the eye diſpoſed in a proper place, the ſeveral ſucceſſive reflexions and refractions neceſſary to produce ſuch an effect did plainly appear.

The light which comes through drops of rain by two refractions, without any reflection, Sir Iſaac Newton obſerves, ought to appear ſtrongeſt, at the diſtance of about twenty-ſix degrees from the ſun, and to decay gradually both ways, as the diſtance from him increaſes and decreaſes: and the ſame is to be underſtood of light, tranſmitted through ſpherical hail-ſtones.—Add, that if the hail be a little flatted, as is often the caſe, the light tranſmitted may grow ſo ſtrong at a little leſs diſtance than that of twenty-ſix degrees, as to form a halo about the ſun or moon; which halo, as often as the hail-ſtones are duly figured, may be coloured; and then it muſt be made red within by the leaſt refrangible rays, and blue without by the moſt refrangible ones; eſpecially if the hail-ſtones have opake globules of ſnow in their center, to intercept the light within the halo, as Huygens has obſerved, and make the inſide thereof more diſtinctly defined than it would otherwiſe be.

Such hail-ſtones, though ſperical, by terminating the light by the ſnow, may make a halo red within, and colourleſs without, and darker in the red than without, as haloes uſed to be: for of thoſe rays, which paſs cloſe by the ſnow, the rubiform will be leaſt refracted, and ſo will come to the eye in the directeſt lines.

HALTER-Cast, among farriers, an excoriation of the paſtern, occaſioned by a horſe's endeavouring to ſcrub the itching part of his body near the head and neck, when one of his hinder feet entangling in the halter, he ſometimes receives very dangerous hurts in the hollow of his paſtern, by his ſtruggling to diſengage himſelf.

For the cure of this, take linſeed oil and brandy of each an equal quantity; ſhake them together in a bottle till they are well mixed, and anoint the place morning and evening, having firſt cut away the hair; but care muſt be taken to keep the foot very clean.

HALTING, among farriers, a limping or going lame, an irregularity in the motion of a horſe, ariſing from a lameneſs in the ſhoulder, leg, or foot, which makes him ſpare the part, or uſe it timorouſly.

HALYMOTE, in old law books, ſignifies a holy or eccleſiaſtical court. See the article Court.

HAM, in anatomy, the part behind the knee. See Knee and Leg.

Ham, in old law writers, a Saxon word uſed for a home or dwelling place, for a borough and a village, and alſo for a little narrow ſlip of meadow.

Ham, in cookery the leg and thigh of a hog ſeaſoned and dried.

HAMADRYADS, *Hamadryades*, fabulous deities revered among the ancient heathens, who were ſuppoſed to preſide over woods and foreſts, and to be incloſed under the bark of oaks, &c. and to live and die with the trees they belong to.

The word is Greek, *αμαδρυαδες*, and compounded of *αμα*, together, and *δρυς*, an oak.

HAMBLING, or Hamelling, in the foreſt law, is the hamſtringing of dogs, or cutting the great tendon called the hamſtring.

HAMLE, the name of the eleventh month of the Ethiopian year, beginning on the twenty-fifth of June, old ſtyle.

HAMLET, Hamel, or Hampsel, is a ſmall village, or part of a pariſh.

HAMMER, a well known tool uſed by mechanics, conſiſting of an iron head, fixed croſſwiſe upon a handle of wood.

HAMMOCK, among ſailors, a piece of canvas about ſix feet long, and three feet wide, drawn together at the two ends, and hung horizontally under the deck for the ſailors to ſleep in. In time of battle, they are ſtrongly faſtened and laid above the rails on the quarter-deck and fore-caſtle, to barricade and prevent the execution of ſmall ſhot.

HAMSOKEN, in old law books, ſignifies the liberty or privilege a man enjoys in his own houſe. It is alſo ſaid to ſignify a franchiſe granted to lords of manors, by which they hold pleas, and take cognizance of the breach of that immunity.

HANAPER, or Hanper, in chancery. See Hanper.

HAND, *Manus*, in anatomy; the laſt part of the upper extremity is divided into the carpus, metacarpus, and fingers, or into the inſide, hollow, or palm, and into the outſide or back of the hand.

The carpus or wriſt conſiſts of eight ſmall, unequal, and irregular bones; and, taken all together, repreſent a ſort of grotto of an irregular quadrangular figure, and connected principally with the baſis of the radius.

The metacarpus conſiſts of four bones, one ſide of which forms the palm of the hand, the other the back of the hand. Theſe bones are long, thicker at the extremities than at the middle, and of an unequal length and bigneſs. The firſt is the largeſt, the reſt are leſſened by degrees in all their dimenſions. The fingers make the third part of the hand, and terminate the whole upper extremity; they are five in number in each hand, called the thumb, the fore-finger, the middle-finger, the ring-finger, and the little-finger. The thumb is the biggeſt of all the fingers; next to that, the third, called the long-finger; the ſecond and fourth are ſhorter than the third; the fourth being a very little longer than the ſecond; the fifth is the ſmalleſt of all.

Each thumb and finger conſiſt of three pieces, called phalanges; the firſt of which is longer and thicker than the ſecond; and the ſecond than the third.

The carpus is the baſis and center of all the motions of the hand, except that of rotation: by means thereof we can bend the hand in all directions, but with more eaſe towards the ſides and edges, than any other way.

The radius is in a manner the handle of the hand; and it is chiefly by means thereof that we can move the hand reciprocally as on the axis, turning either edge of it towards the body. This motion is termed pronation, and when the cubital or ſmall edge is towards the body, it is termed ſupination. In the natural and moſt ordinary ſituation of the hand, the palm is turned towards the body, and not the edges.

The ulna ſupports the handle of the hand, without being itſelf articulated with the hand.

All the bones of the carpus, metacarpus, and fingers, are cruſted over with cartilages.

Hand, in the manege, a meaſure of four inches, or of a clinched fiſt, by which the height of a horſe is computed. Thus a horſe of war ſhould be ſixteen hands high.

Hand is alſo uſed for the diviſion of a horſe into the fore and hind parts. The parts of the fore-hand are the head, neck, and fore-quarters; and thoſe of the hind hand include all the other parts of his body.

Hand is likewiſe uſed for the horſeman's hand. Thus, ſpear-hand, or ſword-hand, is the horſeman's right hand, and bridle-hand is his left hand.

Hand-Breadth, a meaſure of three inches.

Hand-Hook, an inſtrument uſed by ſmiths to twiſt ſquare iron.

Hand-Screw, an inſtrument more uſually called a jack. See the article Jack.

Harmonical Hand, in muſic, a name given to the ancient diagram. See Diagram.

Impoſition of Hands, the ceremony of laying the hands on the head of a perſon to be ordained. See Ordination.

Hands, in heraldry, are borne in coat armour dexter and ſiniſter, that is, right and left, expanded or open. Theſe are the moſt neceſſary parts of the human body, as they ſerve to expreſs all ſorts of actions, and even our very thoughts and deſigns; thus joining of hands is an univerſal token of friendſhip, and clapping of hands a general mark of applauſe.

HANDING *the Sails*, in the ſea-language, the ſame as Furling, which ſee.

HANDSPIKE, a ſort of bar uſed to heave the windlaſs round at the time of weighing the anchor. It is alſo uſed as a lever on many occaſions. See the article Windlass.

HANKS, in the marine, certain wooden rings fixed upon the ſtays of a ſhip, to which the ſtay-ſails are faſtened in different places, as a curtain is faſtened to the rings which run upon its rod: by theſe the ſails are eaſily extended upon the ſtays to their utmoſt ſtretch.

HANPER, Hanaper, or Hamper, an office of the chancery, anſwering to the fiſcus of the Romans.

HANSE, or Hans, a company of merchants united for the promotion and advantage of trade.

Hanse-Towns, port-towns of Germany, of which Lubec and Hamburg were the chief. They were formerly all of them imperial cities, confederated for their mutual defence, and the protection of their trade.

HAPPINESS, among philoſophers, conſiſts in the enjoyment not only of the goods of the body, as health, ſtrength, neatneſs, decency, &c. but alſo of the more refined goods of the mind, as knowledge, memory, taſte, and eſpecially moral virtues, magnanimity, fortitude, benevolence, &c.

HAQUEBUT, Hagbut, Harquebuss, or Arquebuse, a kind of fire-arm.

The word is French, *arquebuſe*, and derived from the Italian *arco*, a bow, and *buſio*, a hole; on account of the touch-hole at which the priming is put, and as it ſucceeded to the ancient bow.

HARANGUE, a ſpeech made by an orator in public.

It is frequently uſed for a pompous and prolix declamation.

HARBINGER, an officer of the king's houſhold, having four yeomen under him, who ride a day's journey before the court, when it travels, to provide lodgings, &c.

HARBOUR, a place where ſhips may ride ſafe at anchor, chiefly uſed in ſpeaking of thoſe ſecured by a boom and chain, and furniſhed with a mole. See Boom, Chain, and Mole.

HARDENING, the act of communicating a greater degree of hardneſs to a body than it had before.

Steel and iron are hardened and tempered divers ways, as by the hammer; quenching it, when hot, in cold water; caſe-hardening, &c.

Caſe-HARDENING is a leſſer degree of ſteel-making, and performed by baking razors, files, knife-blades, &c. in a kind of oven, and laying over them a ſtrata of powdered charcoal, hoofs, horns, &c. ſo as to exclude the air; and thus by baking to give a coat of ſteel to theſe inſtruments ſome depth below their ſurface.

Others cover the iron or ſteel all over with a compoſition of an equal quantity of powdered horn, bay-ſalt, and ſtale urine, or white wine vinegar, well mixed together, and then wrap it up in loam or plate iron, and bring the whole to the fire to a blood-red heat, and no higher; and, laſtly, take it out and quench it.

HARDNESS, in philoſophy, that quality in bodies, whereby their parts mutually cohere together, ſo as not to give way to an external impulſe, nor yield inwards, without breaking. Hardneſs in this ſenſe is in contradiſtinction to ſoftneſs. See the article ATTRACTION *of Coheſion*.

HARDS, or HURDS, the coarſer part of hemp or flax, ſeparated from the fine. See the articles HEMP and FLAX.

HARDY SHRUBS, among gardeners, are thoſe which endure the auſterity of the winter.

The two hardieſt ſhrubs we are poſſeſſed of, are the ivy and box; theſe ſtand the ſeverity of our ſharpeſt winter unhurt, while other ſhrubs periſh, and trees have their ſolid bodies ſplit and torn to pieces. In the hard winter of the year 1683, theſe two ſhrubs ſuffered no injury any where; though the yews and hollies, which are generally ſuppoſed very hardy, were this winter in ſome places killed, and in others ſtripped of their leaves, and damaged in their bark. Furze buſhes were found to be ſomewhat harder than theſe, but they ſometimes periſhed, at leaſt down to the root. The broom ſeemed to occupy the next ſtep of hardineſs beyond theſe; this lived where the others died; and where even this died, the juniper ſhrubs were ſometimes found unhurt. This laſt is the only ſhrub that approaches to the hardineſs of the box and ivy, but even this does not quite come up to them; for while they ſuffer nothing in whatever manner they are expoſed, the juniper, though it bears cold well under the ſhelter of other trees, yet cannot bear the viciſſitudes of heat and cold, inſomuch that ſome juniper ſhrubs were found half dead, and half vigorous; that ſide which faced the mid-day ſun, having periſhed by the ſucceſſive thawings and freezings of its ſap; while that which was not expoſed to the viciſſitudes of heat, had bore the cold perfectly well. Such ſhrubs as are not hardy enough to defy the winter, but appear half dead in the ſpring, may often be recovered by Mr. Evelyn's method of beating their branches with a ſlender hazel wand, to ſtrike off the withered leaves and buds, and giving a free paſſage to the air to the internal parts. Where this fails, the method is to cut them down to the quick; and if no part of the trunk appears in a growing condition, they muſt be taken off down to the level of the ground. *Phil. Tranſ.* N°. 165.

HARE, in zoology, an animal of the lepus kind, diſtinguiſhed by its abrupt tail and black eyes. It greatly reſembles the rabbit, but is larger, and ſomewhat longer, in proportion to its thickneſs; and its ears are remarkably long, being always in a poſition to receive the leaſt ſound, and moveable with ſurpriſing eaſe.

HARE-LIP, *Lebium Laporinum*, in ſurgery. See the article LIP.

HARIOT, or HERIOT, in law, a due belonging to a lord at the death of his tenant, conſiſting of the beſt beaſt, either horſe, ox, or cow, which he had at the time of his death; and in ſome manors, the beſt goods, piece of plate, &c. are called hariots.

HARLEQUIN, a buffoon or merry-andrew; but is now uſed for a perſon of extraordinary agility, dreſſed in party-coloured cloaths, the principal character in a pantomime entertainment. See the article PANTOMIME.

HARMONIA, in anatomy, a ſpecies of articulation, being a kind of ſymphyſis intended for abſolute reſt. See the article ARTICULATION.

HARMONICA, or, as it is often improperly called, ARMONICA, among muſicians, is an inſtrument compoſed of muſical glaſſes.

HARMONICAL ARITHMETIC, that part of arithmetic which conſiders muſical intervals, expreſſed by numbers, in order to our finding their mutual relations, compoſitions, and reſolutions.

HARMONICAL COMPOSITIONS, in a general ſenſe includes both harmony and melody, that is, of muſic or ſongs, both in a ſingle part, and in ſeveral parts.

HARMONICAL INTERVAL, in muſic, denotes the difference of two ſounds, which is agreeable to the ear, whether in conſonance or ſucceſſion; and are, therefore, the ſame with concord. See the articles CONCORD and INTERVAL.

HARMONICAL PROPORTION. See the article PROPORTION.

HARMONICAL SERIES, a ſeries of many numbers in continual harmonical proportion. Thus if there are four or more numbers, of which every three immediate terms are harmonical, the whole will make an harmonical ſeries: ſuch is 30 : 20 : 15 : 12 : 10. Or, if every four terms immediately next each other are harmonical, it is alſo a continual harmonical ſeries, but of another ſpecies, as 3, 4, 6, 9, 18, 36, &c.

HARMONICAL SOUNDS, an appellation given, by Mr. Sauveur, to ſuch ſounds as always make a determinate number of vibrations, in the time that one of the fundamentals, to which they referred, makes one vibration.

HARMONICS, *Harmonica*, a diviſion of the ancient muſic. It conſiders the differences and proportions of ſounds with reſpect to gravity and acuteneſs, in contradiſtinction to rhythmica or metrica.

HARMONY, in muſic, the agreeable reſult of an union of ſeveral muſical ſounds, heard at the ſame time.

The word is Greek, *αρμονια*, and *αρω*, to fit or adapt.

As a continued ſucceſſion of muſical ſounds produces melody, ſo a continued combination of them produces harmony.

HARMONY is ſometimes applied to a ſingle voice, when ſonorous and ſoft; or to a ſingle inſtrument, when yielding a very agreeable ſound.

HARMONY alſo denotes a certain agreement between the ſeveral parts of a diſcourſe, which renders the reading thereof agreeable.

HARMONY, in architecture, an agreeable relation between the parts of a building.

HARMONY, in painting, both in the compoſition and colours of a picture: the former denotes the connexion between the figures, with reſpect to the ſubject of a piece: in the colouring it denotes the agreeable mixture of different colours. M. de la Chambre derives the harmony of colours from the ſame proportions as that of ſounds. On this principle he lays down green as the moſt agreeable colour, correſponding to the octave; red to a fifth; yellow to a fourth, &c.

HARMONY *of the Spheres*, a ſort of muſic much talked of by many of the philoſophers and fathers, ſuppoſed to be produced by the ſweetly tuned motions of the ſtars and planets.

Pre-eſtabliſhed HARMONY, a celebrated ſyſtem of M. Leibnitz, whereby he accounts for the communication between the ſoul and body.

Philoſophers univerſally held, that the ſoul and body act phyſically on each other. Des Cartes firſt ſhewed that the heterogeneity of their nature did not admit of ſuch real union, and that they could only have an apparent one, of which God is the mediator. M. Leibnitz, unſatisfied with either of theſe hypotheſes, eſtabliſhed a third. A ſoul is ſaid to have a certain ſeries of thoughts and deſires; a body, which is only a machine, is to have a certain ſeries of motions, that are determined by the combination of its mechanical diſpoſition with the impreſſions of external objects.

If now a ſoul and body are ſo framed that the whole ſeries of deſires and motions of each exactly correſpond, this ſoul and body will have a relation to one another, not by any actual union, but by the conſtant and perpetual correſpondence between the actions of both. Now God puts together this ſoul and body, which had ſuch an antecedent correſpondence, ſuch a pre-eſtabliſhed harmony. And ſo of other ſouls and bodies that have been or ever will be joined.

The ſame principle he extends to the kingdoms of nature and grace, to account for the apparent communication betwixt them, and to make phyſical and moral evil correſpond. See *Leibn. Eſſais de Theodicée.*

HARNESS, the furniture put upon a horſe to draw in a coach, or other wheel carriage.

HARNESS-GALLS, ſwellings or ſoreneſs on the breaſts of coach horſes, occaſioned by the galling of the harneſs, eſpecially in rainy weather.

To cure this, firſt ſhave off the hair about the ſore very cloſe, and rub the whole breaſt with a lather of water and black ſope; then waſh that part of the breaſt which is uſually covered with the petrel, with ſalt-water, ſuffering it to dry of itſelf. If the hardneſs of any part of the harneſs occaſions the galling, take it away, or cover it with little bolſters.

HARP, a muſical inſtrument of the ſtring-kind, of a triangular figure, and held upright between the legs, to be played upon with the fingers or nails.

The word is variouſly derived; ſome derive it from the High-Dutch *harpff*; others from the Saxon *herrpa*; both ſignify the ſame thing.

Bell HARP, a muſical inſtrument of the ſtring-kind; thus called from the common players of it ſwinging it about as a bell on its biaſs.

It is about three feet long; its ſtrings, which are of no determinate number, are of braſs or ſteel wire, fixed at one end, and ſtretched acroſs the ſound-board, by ſcrews fixed at the other end. It takes in four octaves, according to the number of ſtrings, which are ſtruck only with the thumbs, the right hand playing the treble, and the left the baſe; and in order to draw the ſound the clearer, the thumbs are armed wtth a little wire-pin. This may perhaps be the lyra or cythara of the ancients; but we find no mention of it under the name it now bears, which muſt be allowed to be modern.

HARPIES, *Harpyæ*, *αρϖυιαι*, in antiquity, rapacious impure ſoris of monſters, of the bird-kind, deſcribed by Virg. Æn. III. The ancients looked on the harpies as a ſort of genii.

There were three harpies, Aello, Ocypete, and Celœno; which laſt Homer calls Pedarge.

HARPINEER, or HARPONEER, the perſon who manages the harping-iron.

HARPINGS. See the article SHIP-BUILDING.

HARPING-IRON, or HARPOON, a large ſpear or javelin, made of forged iron, and five or ſix feet long; it is faſtened to a line, and uſed in the whale fiſhery.

HARPSICHORD, the moſt harmonious of all the muſical inſtruments of the ſtring-kind. It is played on after the manner of the organ, and is furniſhed with a ſet and ſometimes with two ſets of keys; the touching or ſtriking of theſe keys move a kind of little jacks, which alſo move a double row of chords or ſtrings, of braſs or iron, ſtretched over four bridges on the table of the inſtrument.

HARRIER, a kind of hound, endowed with an admirable gift of ſmelling, and very bold in the purſuit of his game.

There are ſeveral kinds of harriers; ſome being for the hare, the fox, the wolf, hart, weaſel, badger, &c.

HARROW, in agriculture, an inſtrument uſed by huſbandmen to break the clods of earth, and to draw the ground over the ſeed when ſown. It is a ſort of wooden drag, made in form of a ſquare, with large iron teeth, or tines, not unlike thoſe of a horſe. See HORSE.

HART, a ſtag, or male deer, in the ſixth year. See STAG and CERVUS.

HART, among ſailors, a ſort of dead-eye with only one hole in it, uſed to draw tight the ſtays. See DEAD-EYE and STAY.

HART-ROYAL; one that has been hunted by the king or queen, and eſcaped with life; in which caſe, proclamation is uſually made, that none kill or offend him, as being a hart-royal proclaimed.

HART'S HORNS, *Cornua Cervi*, in pharmacy, the whole horns of the common male deer, as ſeparated from the head, without farther preparation.

The chemical analyſis of hart's horn is ſufficiently known: it yields a water highly impregnated with a volatile ſalt, which is called ſpirit of hart's horn, with a fetid oil, and a volatile ſalt by the common diſtillation in a retort. The remainder in the bottom of the retort, after the diſtillation is finiſhed, is black; but on being calcined in an open fire, it becomes white and friable, and is what is kept in the ſhops under the name of burnt hart's horn. Beſide theſe preparations, we uſe the thin ſhavings of the horn, which, on long boiling in water, become a jelly: this jelly is nutritive and ſtrengthening; it is ſometimes given in diarrhœas; but a decoction of burnt hart's horn in water is more frequently uſed for this purpoſe, and is what is called hart's horn drink.

The ſalt of hart's horn is a great ſudorific, and is given in fevers of many kinds with great ſucceſs; the ſpirit has the ſame and all the other virtues of volatile alkalis, and is uſed to bring people out of faintings by its pungency, on holding it under their noſe, and at the ſame time pouring ſome drops of it in water down the perſon's throat.

HARVEST, the time or ſeaſon that the corn is ripe, and fit to be reaped and taken into barns.

HARVEST-FLY, in zoology, a large four-winged fly, of the cicada kind, very common in Italy, and erroneouſly ſuppoſed to be a graſs-hopper. See CICADA.

HASSIDEANS, or ASSIDEANS, an appellation given to thoſe Jews who reſorted to Mattathias, to fight for the law of God and the liberties of their country.

HASTA, among medalliſts, a kind of javelin, not ſhod or headed with iron; or rather an ancient ſort of ſcepter, longer than ordinary, occaſionally given to all the gods.

HASTATED LEAF, among botaniſts, one reſembling the head of an halbert.

HAT, a covering for the head, chiefly made of hair, wool, &c. worked, fulled, and faſhioned to the figure of the head, and worn by the men throughout the weſtern part of Europe.

Hats are ſaid to have been firſt ſeen about the year 1400; at which time they became of uſe for country wear, riding, &c.

F. Daniel relates that, from the reign of Charles II. in 1449, the uſe of hats and caps is to be dated, which then began to take place of chaperoons and hoods. In proceſs of time the cuſtom paſſed from the laity to the clergy, but this was looked upon as a crying abuſe, and ſeveral regulations were publiſhed to prohibit it, enjoining them to keep to the uſe of chaperoons, made of black cloth, with decent cornets faſtened to their hats; and this upon pain of ſuſpenſion and excommunication. It is true, the uſe of hats is ſaid to be of a longer ſtanding, among the eccleſiaſtics of Brittany, by two hundred years; but theſe were no other than a kind of caps, whence aroſe the ſquare cap now uſed in colleges.

Method of making HATS.—Hats are made either of wool, or the hair of divers animals, as the beaver, hare, rabbit, camel, &c. The proceſs is much the ſame in all. The fineſt hats are made of the pure hairs of the beaver; women tear off the long hair with a knife, like a ſhoe-maker's knife, and the ſhort hair they ſcrape off with another kind of knife: then they mix one-third of dry caſtor to two-thirds of old coat, which is a ſkin that has been worn ſome time by the ſavages. This ſtuff, ſo mixed, is carded, and weighed out into parcels, according to the ſize and thickneſs of the hat intended: then each parcel is teazed with the bow-ſtring to purify it from all filth, and to make the ſtuff fall preciſely together, which is the moſt difficult part of the work. Thus they form hats of an oval figure, ending at top in an acute angle. With what ſtuff remains, they ſtrengthen them where they happen to be ſlender. They purpoſely make them thicker in the brim near the crown, than towards the circumference, or crown itſelf. They next harden the hats into cloſer flakes, by preſſing down the hardening leather upon them; after which they are carried to the baſon, upon which, laying one hat at a time, they ſprinkle it over with water, and mould it: the heat of the fire, the water, and the preſſing, embody the ſtuff into a ſlight airy felt. The maker, having turned up the edges of this felt round the mould, lays it by and takes another, which, when reduced to the ſame conſiſtence and form, he joins them together, ſo as to meet in an angle at top, making only one conical cap.

The next proceſs is to remove the hat to the receiver, or trough, upon the plank or ſloping ſide of which the baſoned hat is laid, being firſt dipped in the kettle: here the hatter rolls and unrolls it, one part after another, firſt with the hand, and then with a little wooden roller, dipping it from time to time for four or five hours, before it can be properly fulled: in which violent labour the workmen have their hands guarded with thick leather, called gloves. A hat thus wrought is reduced to a proper ſhape on the block tied down by a commander, and all under this ſtring is left for the brim; then it is ſet to dry; and when dry enough, it is ſinged by holding it over a flare of ſtraw, &c. then pounced to take off the coarſer nap; then they uſe the ſeal-ſkin; and, laſtly, card it to raiſe the fine cotton; then fitting it to the block, they tie it, cut round the edges, and ſend it to the dyer's, who boils it in a copper that holds between ten and twelve dozen, with a dye of logwood, verdigriſe, copperas, alder-bark, galls, and ſumac, for three quarters of an hour at a time, for ten or twelve times ſucceſſively, taking every hat out after each boiling. The dyer returns it to the maker, who hangs it to dry in the roof of a ſtove, under which is a charcoal fire; and thus prepares it for ſtiffening, which is done with melted glue, or gum ſeneca, ſmeared over it with a bruſh, and rubbed in with the hand; then ſpreading a cloth over the ſteaming-baſon, and ſprinkling it with water to raiſe a ſtrong ſteam to force in the ſtiffening, it is placed thereon brim downwards; and when it is moderately hot, the workman ſtrikes gently on the brim with the flat of his hand, to make the jointings incorporate, turning it this way and that, ſetting it at laſt on the crown: then it is put on the block, bruſhed and ironed on the ſtall-board, and thus finiſhed ready to be lined.

Hat is alſo uſed in a figurative ſenſe, to ſignify the dignity of a cardinal, or a promotion to that dignity.

Hats are alſo made for women's wear, of chips, ſtraw, or cane, by platting, and ſewing the plats together; beginning with the center of the crown, and working round till the whole is finiſhed. Hats for the ſame purpoſe are alſo wove and made of horſe-hair, ſilk, &c.

HATCHEL, or Hitchel, a tool with which flax and hemp are combined into fine hairs. It conſiſts of long iron pins, or teeth, regularly ſet in a piece of board.

There are ſeveral ſorts of hatchels, each finer than the other, with which flax and hemp are prepared for ſpinning. See Flax and Hemp.

HATCHES, or Hatch-Ways, certain holes in the decks of a ſhip, through which the cargo paſſes into the hold and lower apartments: hatches are alſo the covers which lie over theſe holes.

HATCHET, a ſmall light ſort of an ax, with a baſil-edge on its left ſide, and a ſhort handle, as being to be uſed with one hand.

Hatchets are uſed by various artificers, and more particularly in hewing of wood.

HATCHING, the action whereby fœcundated eggs, after a proper time of incubation, exclude their young.

The learned M. Reaumur has obliged the world with an ingenious treatiſe on the method of hatching chickens by an artificial heat.

Hatching, or Haching, in deſigning, &c. the making of lines with a pen, pencil, graver, or the like; and the interſecting, or going acroſs thoſe lines with others drawn a contrary way, is called counter-hatching. The depths and ſhadows of draughts are uſually formed by hatching.

Hatching is of ſingular uſe in heraldry, to diſtinguiſh the ſeveral colours of a ſhield, without being illuminated: thus, gules or red is hatched by lines drawn from the top to the bottom; azure, by lines drawn acroſs the ſhield; and ſo of other colours. See the articles Gules, Azure, &c.

HATCHMENT, in heraldry, a name ſometimes uſed for an atchievement, or eſcutcheon over a gate, door, or on the ſide of an houſe.

Hatchment alſo ſignifies the marſhalling of ſeveral coats of arms in an eſcutcheon. See the article Marshalling.

HATTOCK, a ſhock of corn containing twelve ſheaves: others make it only three ſheaves laid together.

HAVEN, a ſea-port or harbour. See the article Harbour.

HAVER, a term uſed by country people for oats.

HAUNCH, or Hanch, the hip, or that part of the body between the laſt ribs and the thigh.

HAUNT, among ſportſmen, the place to which game are accuſtomed to reſort: among hunters, it is the walk of a deer, or the place of his ordinary paſſage.

HAUTBOY, a muſical inſtrument of the wind kind, ſhaped much like the flute, only that it ſpreads and widens toward the bottom, and is ſounded thro' a reed. The treble is two feet long; the tenor goes a fifth lower, when blown: it has only eight holes; but the baſs, which is five feet long, has eleven.

HAW, in botany, &c. a common name for the fruit of the white-thorn. See the article Mespilus.

Haw, in farriery, is a ſwelling and ſpongineſs that grows in the inner corner of the eye of a horſe, ſo large ſometimes as to cover a part of the eye.

The method of curing it is eaſily performed by cutting part of it away; but the farriers are apt to cut away too much: the wound may be dreſſed with honey of roſes; and if a fungus or ſpongy fleſh ariſes, it ſhould be ſprinkled with burnt allum, or touched with blue vitriol.

HAWK, a ſynonymous term with falcon, though, by ſome, reſtrained to the leſſer ſort of falcons. See Falcon.

HAWKER, in commerce, a pedlar, or perſon that goes about the country ſelling wares: this name is ſaid to ariſe from their uncertain wandering, like perſons, who, with hawks, ſeek their game where they may find it.

HAWKING, the exerciſe of taking wild-fowl by means of hawks.

HAWKWEED, in botany. See the article Hieracium.

HAWSE, in naval architecture, that part of a ſhip's bow through which the cable paſſes, and is drawn into and let out of the ſhip.

HAW-THORN, in botany. See Mespilus.

HAY, any kind of graſs, cut and dried, for the food of cattle.

Whatever uplands are deſigned to be mowed for hay, are to be ſhut up in the beginning of February, and no cattle ſuffered to come upon them afterwards; but meadows and marſh lands, where the graſs grows quicker, need not be ſhut up till April, except the ſpring be bad; and many farmers feed thoſe meadows which are in danger of overflowing till the firſt of May, and then ſhut them up for mowing.

In ſpring, the ſtones, ſticks, and all other kinds of foulneſs that lie upon the land, are to be picked up, and the mole-hills all levelled and ſpread, becauſe they hinder the mowers. If the meadows lie any thing uneven, or if they have been trodden down in winter, they ſhould be rolled all over with a large wooden roller; the mowers will then be able to cut much cloſer; for this, and the quantity of the hay, will very well anſwer the trouble.

The time of mowing the graſs muſt be proportioned to its ripeneſs; nothing can be more prejudicial to the crop, than the cutting it too ſoon, becauſe the ſap is not then fully come out of the root; and ſuch graſs, when dried into hay, ſhrinks up almoſt into nothing. It is very wrong alſo to let it ſtand too long, for, when the ſeed has been ripened, and is ſhed, the moiſture of the ſap all dries away out of the ſtalks, and they become no better than ſo much ſtubble; as is plainly ſeen in thoſe graſſes which grow in hedges, and, not being mowed, die away after they have perfected their ſeeds, and become taſteleſs and very different from hay. The middle or latter end of June is the general ſeaſon for mowing; and the red flowers of the honey-ſuckle beginning to wither, generally give the farmer notice that the time is coming on. But he may be more aſſured of this, by the drops or heads of the graſs looking full, bending downward, and looking brown; it is then in the proper ſtate to be cut down.

If there is great plenty of the hay, and it lie thick in the ſwath, the hay-makers ſhould follow the mowers, and turn the ſwaths, as they cut them, unleſs there ſeems danger of wet weather; but in that caſe it is better to let them lie in the ſwath. At night it muſt be made up into little cocks, and theſe in the morning muſt be ſpread and turned, ſo that the other ſide may wither. After this, it is to be made into ſmall cocks again, and the next day ſpread again, and drawn into long rows, which they call winrows. From theſe it is to be made up into large cocks, after a little drying; and theſe large ones, if any wet comes, are to be ſpread open once again, before they are carried in.

Mowing of land too often, or continuing it too long, is a very great prejudice to it, unleſs it have the advantage of being fed and renewed by land-floods at times. The farmer who has not this advantage to his lands, ſhould feed them once in two or three years, inſtead of making hay from them, unleſs he chuſes to lay on manure conſtantly to keep them in heart. Feeding the hay-lands is the ſame ſort of reſpite that fallowing is to corn-lands, both very neceſſary and advantageous.

Hay-Bote, in law, a liberty to take thorns and other wood, to make and repair hedges, gates fences, &c. by a tenant for life or years.

Hay-Bote is alſo taken for wood for the making of rakes and forks, uſed in making hay.

HAYWARD, the perſon who keeps the common herd or cattle of a town.

He is appointed by the lord's court, and his office is to ſee that the cattle neither break nor crop the hedges of incloſed grounds; he is alſo to look to the fields, and impound cattle that commit treſpaſs therein.

HAZARD, a game on dice, without tables, is very properly ſo called, ſince it ſpeedily makes a man, or ruins him.

It is played with only two dice; and as many may play at it as can ſtand round the largeſt round table. It is certainly one of the moſt bewitching and ruinous games played on the dice. Happy, therefore, the man who either never heard of it, or who has reſolution enough to leave it off in time. See Chance and Gaming.

HAZLE, *Corylus*, in botany, a well known plant, which grows common in England in the woods and hedges; it produces male and female flowers, growing at remote diſtances on the ſame tree: the flowers are diſpoſed in the form of an amentum; the female flowers are ſeſſile, and included in the germ: they have neither corolla nor pericarpium,

carpium. The fruit is a ſubovate nut, with a deraded baſe, and at the top a little compreſſed and acuminated.

Witch-Hazle, a name ſometimes given to the elm. See Elm.

Hazle-Earth, in agriculture, a moderately compact earth, much approaching to the nature of the chiſely ſoil, and indeed properly a ſpecies of it, but always containing a large quantity of reſin-coloured ſand.

HEAD, *Caput*, the uppermoſt or foremoſt part of the body of an animal. When viewed on the outſide, it is divided into the hairy ſcalp and the face. The hairy ſcalp covers the upper part of the os frontis, the oſſa parietalia, the os occipitis, and the upper and lower portions of the temporal bones. The uppermoſt part of the hairy ſcalp is termed the vertex or fontanella; the back part, occiput; the lateral parts, the temples. See Cranium.

Head-Mould-Shot, a diſeaſe in children, wherein the ſutures, generally the coronal, have their edges ſhot over each other, ſo as to compreſs the internal parts. This diſeaſe uſually occaſions convulſions, and admits of no cure, unleſs room could be given by a divulſion of the ſutures. This diſorder is oppoſite to the horſe-ſhoe head. See the article Horse-Shoe-Head.

Head is alſo uſed for the top or extremity of any thing; thus we ſay, the head of a tree, the head of a bone, the head of a nail, &c.

Head, in architecture, an ornament of carved work, or ſculpture, frequently ſerving as the key of an arch, or platband, on another occaſion.

Head, among huntſmen, is uſed for the horns of a deer, as a hart, buck, &c. See Antlers, Royals, Croches, &c.

Head, in the military art. Head of a work is the front of it next the enemy, and fartheſt from the place, as the front of a hornwork is the diſtance between the flanked angles of the demi-baſtions; the head of a double tenaille is the ſaliant angle in the middle; and the two other ſides which form the re-entering angles. See the article Front.

Head, in painting, ſculpture, &c. a repreſentation of that part of the human body, whether in colours, draught, or creux: if taken from the life, or ſuppoſed to bear a juſt reſemblance to the perſon, it is more properly called portrait. See the article Portrait.

Head-Borough, the perſon who is chief of the frank-pledge in boroughs, or who anciently had the government within his own pledge. See the article Frank-Pledge.

Head-Boroughs, at this time, are a kind of conſtables. See Constable.

Head-Land, in huſbandry, is taken to ſignify the upper-part of the land left for the turning of the plough.

Head-Tin, in metallurgy, a preparation of tin-ore toward the fitting it for working into metal. When the ore has been pounded and twice waſhed, that part of it which lies uppermoſt, or makes the ſurface of the maſs in the tub, is called head-tin: this is ſeparated from the reſt, and after a little more waſhing becomes fit for the blowing-houſe.

Moor's Head, is underſtood of a horſe with a black head and feet; the body being uſually of a roan colour. Among engineers a Moor's head is uſed for a kind of bomb or granado, ſhot out of a cannon. Among chemiſts it is a cover, or capital, of an alembic; having a long neck to convey the vapours raiſed by the fire into a veſſel, which ſerves as a refrigeratory. See Alembic.

Dragon's Head, in aſtronomy, &c. is the aſcending node of the moon, or other planet. See the article Node.

Heads, a term uſed by builders for that kind of tile which they uſe to lay at the eaves of a houſe; being the full breadth of a common tile, and but half a tile in length. See the article Tile.

Healing, in architecture, the covering a roof with lead, tiles, ſlate, or the like.

HEALTH, *Hygieio*, *Hygeia*, a proper diſpoſition of the body, and all its parts, for performing their reſpective functions; and this conſiſts in a due connexion. It is likewiſe applied to the mind, and then it means a juſt diſpoſition of the rational powers and paſſions to perform their proper actions; and this, in a great meaſure, depends on bodily health.

The preſervation and reſtoration of health conſtitute the objects of the arts of medicine. The continuance of health depends principally on the ſix non-naturals, air, food, exerciſe, the paſſions, evacuation and retention, ſleeping and waking. The ancients erected a goddeſs, to whom they ſuppoſed the care of health to belong: the Greeks worſhipped her under the name Υγιεια, and the Romans under that of Salus. Her temple at Rome was on the Mons Quirinalis, where ſhe had a ſtatue crowned with medical herbs.

She is repreſented in medals with a ſerpent ſtretched on her left arm, and holding a patera to it with the right: ſometimes ſhe has an altar before her with a ſerpent twiſted round, raiſing its head to take ſomething out of the ſame, with the inſcription SAL. AUG.

HEAM denotes in animals the ſame as after-birth or ſecundines in women.

HEARING, *Auditus*, one of the external ſenſes, being the act or faculty of perceiving ſounds; its organ is the ear, particularly the auditory nerve diffuſed through it; its objects are certain vibrations of the air. See the article Sound.

The ear and its ſeveral membranes, nerves, canals, &c. are vehicles for the reception, modification, ſion, and tranſmiſſion of ſound to the brain, which is the ſeat of this ſenſe. See Ear.

HEARSE, among ſportſmen, a hind of the ſecond year of her age. See Hind.

HEART, *Cor*, in anatomy, a muſcular body ſituated in the cavity of the thorax, on the anterior part of the diaphragm, between the two laminæ of the mediaſtinum. It is ſomewhat conical, flatted on the ſides, round at the top, and oval at the baſis; this laſt is accompanied with appendices, called auriculæ, and by large blood-veſſels; and all theſe are included in a membranous capſula, named pericardium.

It is hollow within, and divided by a ſeptum, which runs between the edges into two cavities; one of which is thick and ſolid, called the left ventricle; the other thin and ſoft, termed the right ventricle; though in their natural ſituation, the right ventricle is placed more anteriorly than the left. Each ventricle opens at the baſis by two orifices, one of which anſwers to the auricles, the other to the mouth of a large artery; one of which may be termed the auricular orifice, the other the arterial orifice. The right ventricle opens into the right auricle, and into the trunk of the pulmonary artery; the left into the left auricle, and into the great trunk of the aorta. At the edges of theſe orifices are ſeveral moveable pellicles, called valves, of which ſome are turned inward towards the ventricles, that let the blood enter the heart, but hinder it from going out the ſame way, and are called triglochines or tricuſpides; others turned towards the great veſſels, which ſuffer the blood to go out of the heart, but hinder it from returning, and are called ſemi-lunares or ſigmoidales. The tricuſpides of the left ventricle are likewiſe termed nitrales.

The inner ſurfaces of the ventricles have thick fleſhy productions called columnæ. To the extremities of theſe columnæ or pillars are faſtened ſeveral tendinous cords, the other ends are joined to the tricuſpides. There are likewiſe other ſmall, ſhort, tendinous ropes along both the edges of the ſeptum, in an obliquely tranſverſe ſituation, forming a kind of net-work.

The cavities of the ventricles are ſmall deep foſſulæ, near each other, with ſmall prominent interſtices between. The greateſt part of the foſſulæ are orifices of the venous ducts.

The fleſhy fibres of the heart, eſpecially thoſe of the right ventricle, are either bent into arches, or folded into angles, the latter being longer than the former. The middle of theſe arches, and the angles of the folds, are turned towards the apex of the heart; and the extremities of the fibres toward the baſis. Theſe fibres not only differ in length, but in their directions, which are very oblique in all, but much more ſo in the long or folded fibres than in the ſhort ones.

Each ventricle is compoſed of its proper diſtinct fibres; but the left has many more than the right. By carefully unravelling all the fibres of the heart, we find it to be made up of two bags contained in a third.

The tubes which croſs tranſverſely are much more numerous than thoſe which croſs longitudinally; which will ſerve to rectify the falſe notion about the motion of the heart, that it is performed by a contortion like a ſcrew; that the heart is ſhortened in the time of contraction, and lengthened in dilatation.

The tricuſpidal valves of the right ventricle are three triangular productions, very ſmooth on that ſide next the auricle, and on the ſide next the ventricle ſeveral membranous and tendinous expanſions, and their edges notched. The valves of the auricular orifice of the left ventricle are of the ſame ſtructure, and but two in number.

The ſemi-lunar valves are ſix in number, three belonging to each ventricle, ſituated at the mouths of the great arteries, and may be properly enough called valvulæ arteriales.

The auricles are muſcular bags, ſituated at the baſis of the heart, one towards the right ventricle the other towards the left, and joined together by an inner ſeptem and external communicating fibres, much like the ventricles; one of them being called the right auricle, the other the left. They are very uneven on the inſide, but ſmoother on the outſide, and terminate in a narrow, flat, indented edge, like a cock's comb.

The right auricle is larger than the left, and it joins the right ventricle by a common tendinous opening. It has two other openings united into one, and formed by two large veins, which meet and terminate there, almoſt in a direct line, called vena cava, ſuperior and inferior: the notched edge of this auricle terminates obliquely in a kind of obtuſe point, which is a ſmall production of the great bag, and is turned towards the middle of the baſis of the heart.

The whole inner ſurface of the right auricle is uneven, by reaſon of a great number of promenent lines, which run acroſs the ſides of it, and communicate with each other by ſmaller lines, which lie obliquely in the interſtices between the former.

The left auricle is pretty thick and unequally ſquare, into which the four veins open that are called venæ pulmonares, and which has a diſtinct appendix belonging to it, like a third ſmall auricle.

Beſides the great common veſſels, the heart has ſome peculiar to itſelf, called the coronary arteries and veins, as in ſome meaſure they crown the baſis of the heart. Theſe arteries, which are two in number, called the right and left coronaries, go out from the beginning of the aorta, and afterwards ſpread round the baſis of the heart, to the ſubſtance of which they ſend numerous ramifications. The exterior courſe of the vein is pretty much the ſame with that of the arteries; their trunk opens principally into the right auricle, by a particular orifice, furniſhed with a ſemi-lunar valve: all the coronary veſſels and their ramifications communicate with each other. The pericardium conſiſts of three laminæ, the middle and principal of which is compoſed of very fine tendinous filaments croſſing each other in different directions. The external lamina ſeems to be a continuation of the outer coat of the heart, auricles, and great veſſels.

The pericardium is cloſely connected to the diaphragm, not at the apex, but exactly at that place which anſwers to the flat or lower ſide of the heart; the reſt of the bag lies upon the diaphragm without any adheſion. The external lamina, or more properly common covering, is formed by the duplicature of the mediaſtinum. The internal lamina is perforated by an infinite number of very ſmall holes, through which a ſerous fluid continually tranſudes, in the ſame manner as in the peritonæum: ſometimes, upon diſſection, it is of a reddiſh colour, which may be owing to a tranſudation of blood through the fine membrane of the auricles.

The heart and parts belonging to it are the principal inſtruments of the circulation of the blood. The two ventricles ought to be conſidered as two ſyringes ſo cloſely joined together as to make but one body, and furniſhed with ſuckers in contrary directions to each other; ſo as that, by drawing one of them, a fluid is let in, and forced out again by the other.

The heart is made up of a ſubſtance capable of contraction and dilatation. When the fleſhy fibres of the ventricles are contracted, the two cavities are leſſened in an equal and direct manner, more according to the breadth or thickneſs, than according to the length of the heart; becauſe the number of tranſverſe fibres is much greater than that of the longitutudinal ones.

The fleſhy fibres, thus contracted, do the office of ſuckers, by preſſing upon the blood in the ventricles; which blood being forced to the baſis of the heart, preſſes the tricuſpidal valves againſt each other, opens the ſemi-lunares, and ruſhes with impetuoſity through the arteries of their ramifications, as through ſo many elaſtic tubes. The blood, thus puſhed on, enters the capillary veſſels, and is from thence forced to return by the veins to the auricles, which, like retirements, lodge in the blood returned by the veins during the time of a new contraction, which is termed ſyſtole.

The contraction or ſyſtole ceaſes immediately; and in that time the auricles, which contain the venous blood, being contracted, force the blood thro' the tricuſpidal valves into the ventricles, the ſides of which are thereby dilated, and this dilatation is called diaſtole. In this manner does the heart perform the circulation, and that three different ways: the firſt, and moſt univerſal kind of circulation, is that by which almoſt all the arteries of the body, are filled by the ſyſtole of the heart, and the greateſt part of the veins evacuated by the diaſtole.

The ſecond kind of circulation, oppoſite to the firſt, is through the coronary veſſels of the heart, the arteries of which are filled with blood, during the diaſtole of the ventricles, and the veins emptied during the ſyſtole.

The third kind is that of the left ventricle of the heart, through the venous ducts of which a ſmall quantity of blood paſſes, without going through the lungs, which is the courſe of all the remaining maſs of blood. *Winſlow.*

HEARTS-EASE, in botany. See Viola.

HEAT, *Calor*, one of the qualities of the body, oppoſed to cold. Its preſence is known, and its degree meaſured by the expanſion of the air or ſpirit in the thermometer. It is properly a ſenſation excited in us by the action of fire, ſo that it is a particular modification of our minds, and not any thing exiſting in that form in the body that occaſions it. Heat, in the body that communicates it, is only motion; in the mind, a particular diſpoſition of the ſoul.

Heat, with reſpect to the effect produced on us, is eſtimated by its relation to the organ of feeling, no object appearing to be hot, unleſs its heat exceed that of our bodies.

Heat, in geography. The diverſity of the heat of climates and ſeaſons ariſes from the different angles, under which the ſun's rays ſtrike on the earth's ſurface.

It is ſhewn in mechanics, that a moving body ſtriking perpendicularly on another, acts on it with all its force; and that a body ſtriking obliquely acts with the leſs force, the more it deviates from the perpendicular. Now fire, moving in right lines, muſt follow the ſame law, and conſequently its action muſt be meaſured by the ſine of the angle of incidence: and hence fire, ſtriking on any obſtacle in a direction parallel thereto, has no ſenſible effect, by reaſon the ratio is almoſt infinite, that is, nothing.

Hence Dr. Halley gives a mathematical computation of the effect of the ſun under different climates and ſeaſons, going on this principle, that the ſimple action of the ſun, as all other impulſes, is more or leſs forcible, according to the ſines of the angles of incidence, or to the perpendicular let fall on the plane: whence the vertical ray being put for radius, the force of the ſun on the horizontal ſurface of the earth will be to that, as the ſine of the ſun's altitude at any other time. Hence it follows, that the time of the continuance of the ſun's ſhining being taken for a baſis, and the ſines of the ſun's altitudes erected thereon as perpendiculars, and a curve drawn through the extremities of thoſe perpendiculars, the area comprized therein will be proportional to the collection of the heat of all the ſun's beams in that ſpace of time.

Hence it will alſo follow, that under the pole the collection of all the heat of a tropical day is proportionate to a rectangle of the ſine of 23 degrees and a half into 24 hours, or the circumference of a circle; that is, the ſine of 23° and $\frac{1}{2}$ being nearly $\frac{4}{10}$ of radius, as $\frac{8}{10}$ into 12 hours: or the polar heat is equal to that of the ſun continuing 12 hours above the horizon at 53° height, than which the ſun is not five hours more elevated under the equinoctial.

But whereas the nature of heat is to remain in the ſubject, after the luminary is removed, and particularly in the air; under the equinoctial, the 12 hours abſence of the ſun does but little diminiſh the motion impreſſed by the paſt action of his rays, before he riſes again: but under the pole, the long abſence of the ſun for ſix months, wherein extreme cold obtains, hath ſo chilled the air, that it cannot, before the ſun has got far towards it, be any ways ſenſible of his preſence, his beams being obſtructed by thick clouds and perpetual fogs. Add to this, that the different degrees of heat and cold in different places depend, in a great meaſure, upon the accident of ſituation with regard to mountains, vallies, &c. the firſt greatly helping to chill the air by the winds that blow over them, and which come in eddies through the adjoining levels. Mountains ſometimes have the effect of a burning mirrour on the adjacent plane, and the ſame effect is ſometimes produced from the concave or convex parts of clouds, either by refraction or reflection. And ſome take theſe to be ſufficient to produce thunder, lightning, &c.

A ſtony, ſandy, or chalky ſoil reflects moſt of the rays into the air again, and retains but few, whereby a conſiderable acceſſion of heat is made to the air; as, on the contrary, black earths abſorb moſt of the rays and return few into the air.

HEAT, in the animal œconomy, known by the ſeveral names of natural heat, vital heat, innate heat, and animal heat, is commonly ſuppoſed to be that generated by the attrition of the parts of the blood, occaſioned by its circulatory motion, eſpecially in the arteries.

To what organs, or operations, the heat of the human body, and other animal bodies, is owing, is hitherto extremely doubtful. The opinions that at preſent prevail are, 1. That the heat of animal bodies is owing to the attrition betwixt the arteries and the blood. 2. That the lungs are the fountain of this heat. 3. That the attrition of the parts of the ſolids on one another produce it. 4. That it is owing to the mechanical attrition of the particles of our fluids. To which opinions Dr. Stevenſon of Edinburgh, adds a 5th, viz. That whole proceſs by which our aliment and juices are conſtantly undergoing ſome alteration.

HEATH, in botany. See ERICA.

HEAVEN, *Cœlum*, that orb over our heads where the heavenly bodies revolve. Philoſophers, divines, and aſtronomers, lay down divers heavens, as the higheſt or empyrean heaven, the æthereal or ſtarry heaven, and the planetary heaven.

HEAVEN, among divines, called the empyrean, is the abode of God, and bleſſed ſpirits, ſuch as angels, and the ſouls of the righteous deceaſed. This in ſcripture is frequently called the kingdom of heaven, the heaven of heavens, the third heaven, paradiſe, the new Jeruſalem, &c. This heaven is conceived as a place where the Deity is pleaſed to afford a more immediate view of himſelf than in the other parts of the univerſe, where he is likewiſe preſent. This makes the beatific viſion. The inſpired writers, particularly Iſaiah and St. John the divine, give us very magnificent deſcriptions of heaven, its ſtructure, apparatus, and attendance. Euſebius charges Plato with borrowing his deſcription of heaven, *in Dial. de Anima*, from the ſcriptures, ſo near is the reſemblance.

HEAVEN, in aſtronomy, called the æthereal and ſtarry heaven, is that immenſe region where the ſtars, planets, and comets are ranged.

Sir Iſaac Newton has abundantly ſhewn the heavens to be void of all reſiſtance, and conſequently almoſt all matter, from the planets perſiſting in their motions without any ſenſible diminution of their velocity, and the comets paſſing freely in all directions.

The ancient aſtronomers aſſumed as many heavens as they obſerved different motions therein; all which they ſuppoſed ſolid and ſpherical. Thus, there were ſeven heavens for the ſeven planets; the eighth was for the fixed ſtars, which they called firmament: Ptolemy adds a ninth, which he called the primum mobile. K. Alphonſus added two cryſtalline heavens to account for ſome irregularities in the heavenly motions; and, laſtly, an empyrean heaven was drawn over the whole for the reſidence of the Deity.

The cryſtalline heavens were ſuppoſed to have no ſtars fixed in them; they encompaſſed the inferior, ſtarry, and planetary heavens, communicating their motion thereto. The firſt ſerved to account for that ſlow motion of the fixed ſtars, whereby they advance a degree eaſtward in ſeventy years: whence the preceſſion of the equinoxes. The ſecond was to ſolve the phænomena of libration or trepidation.

Eudoxus ſuppoſed twenty-three heavens, Calippus thirty, Regiomontanus thirty-three, Ariſtotle forty-ſeven, and Fracaſtor ſeventy.

The aſtronomers did not much concern themſelves bout the reality of theſe heavens, provided they erved to account for any of the celeſtial motions, and agreed with phænomena.

HEAVING, among ſeamen, the act of turning a windlaſs or capſtern by the help of long bars thruſt into holes or mortices cut in the bodies of them. See the articles Windlass and Capstern.

Heaving *a-head*, drawing a ſhip a-head by heaving in the cable, and thereby making her advance towards the anchor or other place where the cable or rope which draws her onward is faſtened.

Heaving-Down, the ſame with careening. See Careening.

HEBDOMARY, a ſolemnity of the ancient Greeks, in honour of Apollo, in which the Athenians ſung hymns to that god, and carried in their hands branches of laurel. The word ſignifies the ſeventh day, this ſolemnity being obſerved on the ſeventh day of every lunar month.

HEBRAISM, an idiom or peculiar manner of expreſſion in the Hebrew language.

HEBREW, or Hebrew-Language, that ſpoken by the ancient Jews, and wherein the Old Teſtament is wrote.

This appears to be the moſt ancient of all languages in the world, at leaſt we know of none older: and ſome learned men are of opinion that this is the language in which God ſpoke to Adam in Paradiſe, and in which the ſaints will ſpeak in heaven.

Hebrews, or *Epiſtle to the* Hebrews, a canonical book of the New Teſtament.

Though St. Paul did not prefix his name to this Epiſtle, the concurrent teſtimony of the beſt authors, ancient and modern, afford ſuch evidence of his being the author of it, that the objections to the contrary are of little or no weight.

The Hebrews, to whom this Epiſtle was wrote, were the believing Jews of Paleſtine, and its deſign was to convince them, and, by their means, all the Jewiſh converts, whereſoever diſperſed, of the inſufficiency and aboliſhment of the ceremonial and ritual law. In order to which he undertakes to ſhew, firſt, the ſuperior excellency of Chriſt's perſon above that of Moſes: ſecondly, the ſuperiority of Chriſt's prieſthood above the levitical: thirdly, the mere figurative nature, and utter inſufficiency of the legal ceremonies and ſacrifices: and, fourthly, that to forſake the Moſaical law, was not, as the Jews boldly aſſerted, to apoſtatize from God, but was their indiſpenſible duty and obligation. Theſe particulars are intermixed with proper inferences and exhortations, all tending to ſhew the Jewiſh Chriſtians the unreaſonableneſs, folly, and danger of relapſing into Judaiſm.

HECATOMB, *Hecatombe*, in antiquity, a ſacrifice of an hundred oxen, at as many altars, and by as many prieſts.

Pythagoras we are told ſacrificed a hecatomb to the muſes, for joy of diſcovering the demonſtration of the 47th Prop. of Euclid's firſt book.

HECKLE. See Hatchel.

HECKLING *of Hemp and Flax*. See Hemp and Flax.

HECTIC, or Hectic Fever. See *Slow* Fever.

HEDERA, ivy, in botany. See Ivy.

Hedera Terrestris, ground ivy, a genus of plants called by Linnæus glechoma. See Glechoma and Ground Ivy.

HEDGE, in agriculture, a fence incloſing a field or garden, made of buſhes, boughs, &c. interwoven together.

The word is Saxon, *hegge*, or *hege*, which literally ſignifies circumference or incloſure.

For quickſet hedges, hawthorn is allowed to be the beſt of all the Engliſh ſhrubs. The beſt method of raiſing this for uſe, is to put the haws into the ground as ſoon as ripe, and cover them with earth; and by the ſpring twelvemonth, the ſhoots will be fit to tranſplant from the ſeed-plot into hedge-rows. The crab-tree is a common mixture with the hawthorn in hedges; but grows faſter than the hawthorn, and requires cutting to keep the hedge even. The young hawthorns raiſed from ſeed always thrive better than thoſe picked up wild in the fields. *Moreton's Northampt.*

The great conſideration, in making quick-ſet hedges, is to bring the plants from a worſe ſoil than that in which it is intended to ſet them. They muſt be about the thickneſs of one's thumb, well rooted and ſtrong, and muſt be planted about four or five inches out of the ground. If there be a ditch to the hedge, it ſhould be three feet wide at the top, one at the bottom, and two deep; and, if wider, then deeper in proportion.

If the bank be without a ditch, the plants ſhould be ſet in two rows at a foot diſtance below one another. The turf is to be laid with the graſs ſide downward on that ſide of the ditch on which the bank is deſigned to be made, and ſome of the beſt mould muſt be laid upon it to bed the quick; then the quick is to be laid upon it a foot aſunder, ſo that the end of it may be inclining upwards; and at equal diſtances of thirty feet, plant an aſh, oak, crab, or elm, to grow with the quick. When the firſt row of quick is laid, it muſt be covered with mould, and the turf laid upon it as before, and ſome more mould upon that; ſo that when the bank is a foot high, another row of ſets may be laid againſt the ſpaces of the lower quick. Theſe muſt be then covered as the former, and the bank is to be then topped with the bottom of the ditch, and a dry or dead hedge laid, to ſhade the under plantation. There ſhould then be ſtakes driven into the looſe earth quite down to the firm ground, at about two feet and a half diſtance from each other; oak ſtakes are accounted the beſt of all for uſe, and, the next to this, thoſe of black-thorn or ſallow. Small buſhes are to be laid below, but not too thick, only to cover the quick from being injured as it ſhoots.

HEDYOTIS, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped, with four ſubulated ſtamina inſerted in the corolla. The fruit is a bilocular capſule, containing a few angular ſeeds.

HEDYSARUM, the French honeyſuckle, in botany, a genus of plants producing papilionaceous flowers. The fruit is a bivalve articulate pod, containing at each joint (which is compreſſed and roundiſh) one kidney-ſhaped ſeed. There are ſeveral ſpecies belonging to this genus; that which is beſt known in our gardens is a biennial plant, and flowers the ſecond year; it ſends forth ſeveral branching ſmooth hollow ſtalks, about two or three feet high; theſe are furniſhed with winged leaves, compoſed of five or ſix pair of oval lobes, terminated with an odd one; from their baſe comes out the foot-ſtalks, which are five or ſix inches long, ſuſtaining ſpikes of beautiful red flowers. It blows in June or July, and the ſeeds ripen in September. They are propagated by ſowing the ſeeds in the ſpring.

HEEL, in anatomy, the hinder-part of the foot. See FOOT and CALCANEUM.

HEEL *of a Horſe*, the lower hinder part of the foot, comprehended between the quarters, and oppoſite to the toe.

HEEL *of a Maſt*, the foot or lower end of it.

HEEL *of a Ship*, the hindmoſt or aftmoſt part of a ſhip's keel.

HEELING, in the ſea-language, ſtooping or inclining to one ſide, either by the preſſure of ſail at ſea, or to clean the ſhip's bottom, &c. See the article CAREEN and BOOT-TOP.

HEGIRA, in chronology, a celebrated epocha among the Arabs and Mahometans.

The word is Arabic, *hagirah*, which ſignifies flight.

The event which gave occaſion to this epocha was Mahomet's flight from Mecca; the magiſtrates of this city, fearing this impoſtor might raiſe a ſedition, expelled him on the 15th or 16th of July, in the year 622, being the 14th year of his aſſuming the character of prophet, and under the emperor Heraclius.

There is an earlier Hegira in the ſame year, when Mahomet and his diſciples relinquiſhed Medina. Both theſe hegira's the Mahometan's call hegiratan.

HEIGHT, *altitudo*, in geometry. See the article ALTITUDE.

HEIR, *Hæres*, in law, ſignifies a perſon who ſucceeds another by deſcent to lands, tenements, hereditaments, being an eſtate of inheritance, or an eſtate in fee; becauſe nothing paſſes by right of inheritance but in fee.

HEIR-APPARENT is a perſon ſo called in the life-time of his anceſtor, at whoſe death he is heir at law.

HEIRESS, a female heir to one who has an eſtate in lands, &c. Stealing an heireſs, and marrying her againſt her will, was declared felony by 3 Hen. VII.

HEISTERIA, in botany, a genus of plants, whoſe flower conſiſts of five ovate concave patent petals, with ten filaments topped with roundiſh antheræ. The fruit is an oblong drupe, depreſſed at the top, containing an oval obtuſe nut.

HELENIUM, baſtard ſun-flower, in botany, a genus of plants, whoſe flower is compound and radiated; the corollulæ, which form the diſc, are numerous and hermaphrodite, of a tubulous form, and quinquedentated at the limb; the female florets which compoſe the rays, are linear, ligulated, and trifid at the point; the ſtamina are five ſlender and very ſhort filaments, topped with cylindrical anthæra; the ſeeds are ſingle, and placed on a convex naked receptacle.

HELENIUM is alſo uſed ſometimes for elecampane. See ELECAMPANE.

HELEPOLIS, in the ancient art of war, a machine for battering down the walls of a place beſieged, the invention of which is aſcribed to Demetrius the Poliorcete.

HELIACAL, in aſtronomy, a term applied to the riſing or ſetting of the ſtars, or, more ſtrictly ſpeaking, to their emerſion out of and immerſion into the rays and ſuperior ſplendor of the ſun.

A ſtar is ſaid to riſe heliacally, when, after being in conjunction with the ſun, and ſo inviſible, it gets at ſuch a diſtance as to be ſeen before the ſun riſe; and it ſets heliacally, when it approaches ſo near the ſun as to be hid by its rays: ſo that ſtrictly theſe are only an apparition and occultation.

The heliacal riſing of the moon happens when ſhe is ſeventy degrees diſtant from the ſun; for the other planets twenty degrees diſtance is required; and for the ſtars more or leſs, according to their magnitude.

To find by the globe the time of the year when any known ſtar or planet will riſe or ſet heliacally: rectify the globe, and bring the ſtar or planet to the eaſt part of the horizon; then ſee what degree of the ecliptic is elavated above the weſtern horizon, according to the reſpective arch of viſion: then the oppoſite degree on the horizon, ſo found, compared with the calendar, will ſhew you the day of its riſing; and for its ſetting bring the ſtar or planet to the weſt ſide of the horizon; obſerve to the eaſt what degree is elevated equal to the known arch of viſion; then, by the oppoſite degree, will be found the day of its ſetting.

HELIANTHEMUM, dwarf ciſtus, in botany,

a genus of plants, whoſe flower hath five roundiſh patent petals, with a number of erect ſtamina. The fruit is a roundiſh or oval capſule of one cell, opening with three valves, and filled with ſmall roundiſh ſeeds.

This genus is included among the ciſtuſes by Linnæus.

HELIANTHUS, the great ſun-flower, in botany, a genus of plants, whoſe flower is compound and radiated; on the diſc is placed a multitude of hermaphrodite cylindraceous florets; the rays are compoſed of a few very long, ſpearſhaped, ligulated, female ones; the ſtamina are five curved filaments, topped with cylindraceous antheræ; the ſeeds are ſolitary, oblong, tetragonal, and contained in the cup; the flowers are all yellow, and often more than a foot in diameter.

This genus is the ſame as the corona ſolis of other authors, and includes the Jeruſalem artichoke which is a ſpecies of it.

HELICE, in aſtronomy, is the ſame with urſa major. See URSA.

HELICTERES, the ſcrew-tree, in botany, a genus of plants, whoſe flower conſiſts of five oblong equal petals, which are affixed to the receptacle; the ſtamina are ten very ſhort filaments, topped with oblong antheræ. The fruit is compoſed of five unilocular capſules, ſpirally twiſted, and contains many angulated ſeeds.

HELIOCARPOS, in botany, a genus of plants, whoſe flower hath a tetraphyllous coloured perianthium, including four linear petals, conſiderably ſhorter and narrower than the cup; the ſtamina are twelve filaments, topped with twin incumbent antheræ. The fruit is a pedunculated bilocular capſule, of a turbinated oval figure, bordered with hairs reſembling rays, and the ſeed is oval and ſolitary.

HELIOCENTRIC *Place of a Planet*, that place or point in the ecliptic, wherein a planet would appear to a ſpectator placed in the center of the ſun.

The word is Greek, and compounded of ηλιος, the ſun, and κεντρον, a center.

The heliocentric place is the ſame with the longitude of a planet viewed from the ſun.

HELIOCENTRIC *Latitude of a Planet*, the latitude it would appear in at any time to a ſpectator placed in the ſun.

HELIOCOMETES, a phænomenon ſometimes obſerved about ſun-ſetting; being a large luminous tail, or column of light, proceeding from the body of the ſun, and dragging after it, not unlike the tail of a comet; whence the name.

HELIOSCOPE, in optics, a ſort of teleſcope, peculiarly adapted for obſerving the ſpots, eclipſes, &c. of the ſun.

The word is Greek, and compounded of ηλιος, the ſun, and σκοϖεω, to view.

There are various apparatuſes of this kind: Dr. Hook recommends four reflecting glaſſes placed in the tube, whereby the force of the rays will be ſo weakened, as only to ſtrike the eye with a 256th part of their force; and this he prefers to all others.

M. Huygens only blackens the inſide of the eye-glaſs of the teleſcope, by holding it over the flame or ſmoke of a lamp, &c. or rather he blackens a piece of plain glaſs, and holds it between the eye and the object-glaſs; or, which is beſt of all, he claps the ſmoked glaſs to another, with a rim of thick paper between to keep the black from rubbing off, and fits the two into a frame, to be applied between the eye and the eye-glaſs. But the beſt method of viewing this luminary, is by the ſolar teleſcope. See *Solar* TELESCOPE.

HELIOSTATA, in optics, an ingenious inſtrument invented by the learned Dr. s'Graveſande; ſo called from its uſe, which is to fix, as it were, the rays of the ſun in a horizontal direction acroſs the dark chamber, all the while it is in uſe.

The word is formed from the Greek, ηλιος, the ſun, and ϛατιζω, to ſtop or fix.

This inſtrument is an automaton, or piece of clock-work, whoſe parts are as follow:

A A (plate LXI. *fig.* 1) is a frame, about which a metalline ſpeculum S is ſuſpended, moveable about its axis, by means of two ſmall ſcrews *a*, *a*. This frame is fixed to the piece C, which being hollow is moveable upon the cylindric ſhaft P. This pillar is fixed on a triangular baſe or foot ſet perpendicularly, by the three ſcrews B, B, B.

On the back part of the ſpeculum is fixed a long cylindric wire, or tail D, in a perpendicular poſition. By this it is connected to the ſecond part of the helioſtata, which is a common thirty-four hour clock, repreſented at H; the plane of which clock is ſet parallel to that of the equator in any given place. This clock is ſuſtained on the column F G, in which it is moveable up and down by a thin lamina or plate that enters it as a caſe, and fixed to a proper height by two ſcrews *d*, *d*, at the ſide. The whole is truly adjuſted to a perpendicular ſituation by means of three ſcrews I, I, I, in the tripod L, L, M, and the plummet Q, whoſe capſis muſt anſwer to the point *o* beneath.

The axis of the wheel which moves the index N O, over the hour circle, is ſomewhat large, and perforated with a cylindric cavity approaching a little to a conical figure; and receives the ſhank of the ſaid index N O very cloſe and tight, that by its motion the index may be carried round. In the extremity O of the index is a ſmall cylindric piece, with a cylindric perforation to receive the tail *t* of the fork T, yet ſo as to admit a free motion therein. In each ſide of the fork are ſeveral holes exactly oppoſite to each other, in which go the ſcrews *r*, *r*,

upon

PLATE LXI.

Facing Helioſtata.

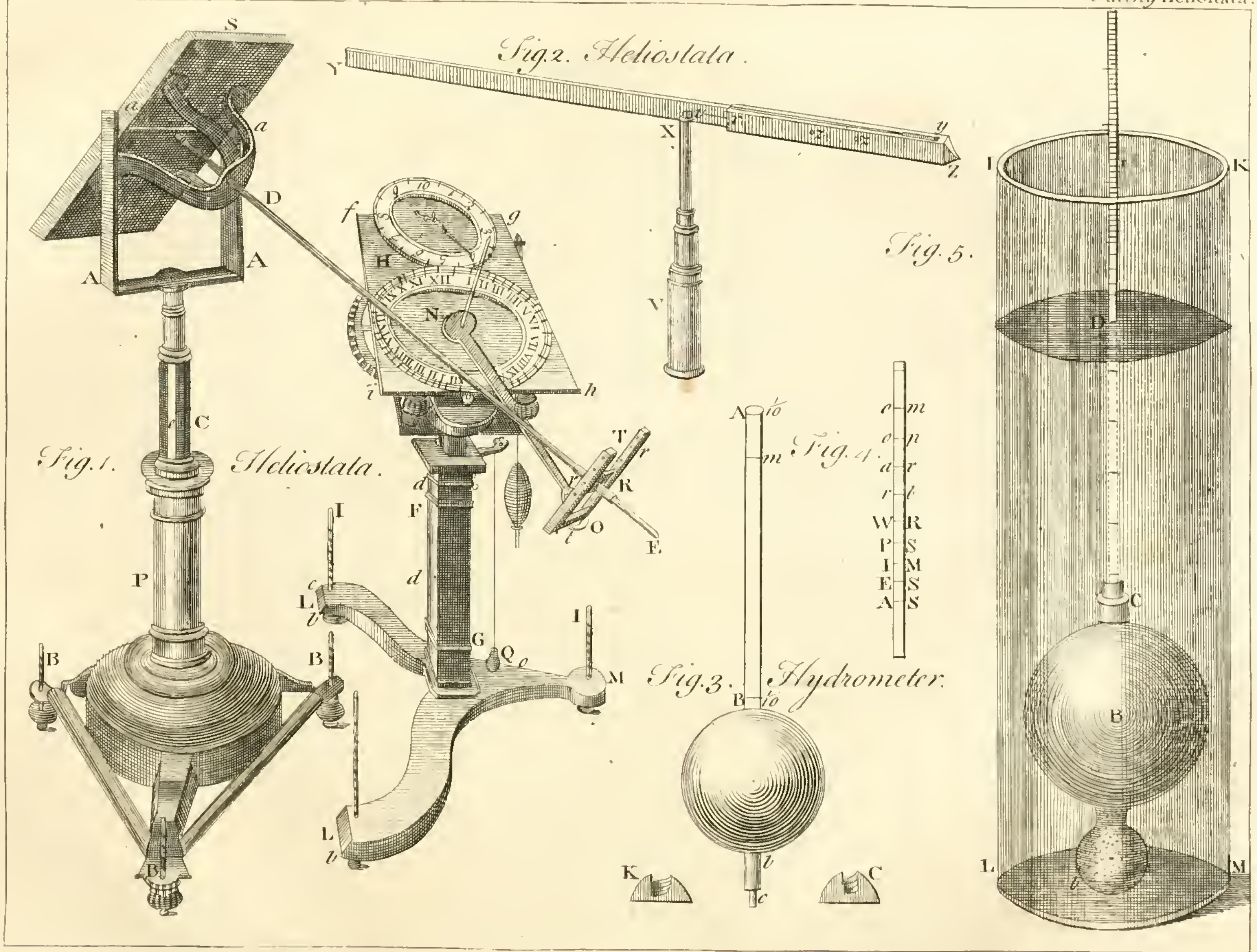


Fig. 1. Heliostata.

Fig. 2. Heliostata.

Fig. 3. Hydrometer.

Fig. 4.

Fig. 5.

J. Lodge sculp.

upon whoſe ſmooth cylindric ends moves the tabular piece R.

When the machine is to be fixed for uſe, another part is made uſe of to adjuſt it; which is called the poſitor, and is denoted by the letters V X Y Z, *fig.* 2.

The cylinder C is removed with a ſpeculum from the foot P, and the braſs column V X put on in its ſtead, and adheres more ſtrictly to the pin *e*, that it may keep its poſition while the machine is conſtituted.

On the top of the column, about X as a center, moves the lever Y Z, ſo that it may be any how inclined to the horizon, and keeps its poſition. The arm Y X may be of any length at pleaſure; but the arm X Z is of a peculiar conſtruction, and of a determinate length. To this arm, which extends no farther than *y*, is a ſliding piece Z *x*, ſharp pointed at Z. By this the arm X Z is determined to a given length, the piece Z *x* being fixed by the ſcrews *z z*. Upon this arm is drawn the ſhort line *vx*, by which it may be lengthened in the whole, and is $\frac{9}{100}$ of the whole lenth X Z, when ſhorteſt. The reaſon is, this arm is always to increaſe and decreaſe in proportion to the ſecant of the ſun's declination to the radius X Z, when ſhorteſt; but the radius is to the ſecant of 23° 30′, the ſun's greateſt declination, as 10000000 to 10904411, or as 100 to 109. Now the reaſon of this conſtruction of the arm X Z, is to find for any given day the diſtance of the center of the ſpeculum S from the top *l* of the ſtyle *l* N, which muſt ever be equal to the ſecant of the ſun's declination; for it muſt always be equal to the diſtance of the top of the ſaid ſtyle, *l*, from the center of the cylinder R in the fork T, and that is always equal to the ſaid ſecant of declination.

For ſince the ſtyle *l* N and the fork T are in a poſition parallel to each other, therefore the middle hole in the ſides of the fork being, as they muſt be, of the ſame height above the end of the index O, as in the height of the ſtyle N *l*, it is evident that on an equinoxial day the ſun's rays will paſs directly thro' the perforation of the piece R, if it be put in a poſition parallel to the plane of the ecliptic, or that of the clock; and alſo that the top of the ſhadow of the ſaid ſtyle will fall exactly on the ſaid hole.

In this caſe, the top of the ſtyle is at the leaſt diſtance from the central point of R, and therefore may be repreſented by radius; while in any other poſition above or below, the diſtance will increaſe in proportion to the ſecant of the angle which the rays make with this firſt or middle ray, that paſs by the top of the ſtyle, and through the hole R.

Now it may be demonſtrated, that on any day of the year, if the clock and its pedeſtal be ſo fixed that the line of XII be exactly in the meridian, and that the poſition of R in the fork be ſuch that the ſun's rays go directly through it, and the ſhadow of the ſtyle's top fall juſt upon the hole; moreover, if the diſtance of the center of the ſpeculum S from the top of the ſtyle *l* be made equal, by the poſitor, to the diſtance of the central point R therefrom; and, laſtly, the tail of the ſpeculum D E paſſing through R; then if the clock be put into motion, the index N O ſhall carry about the tail of the ſpeculum, in ſuch a manner, that at all times of that day, when the ſun can come upon the ſpeculum, it will reflect the rays conſtantly in one and the ſame poſition and direction all the time without variation.

The machine thus conſtituted, is placed in a box or caſe, and ſet in the window with one ſide open, expoſed to the ſun, and all the other parts cloſe; ſo that when the room is made dark, and the ſolar microſcope fixed to the fore-part of the box in which the helioſtata is placed, juſt againſt the center of the ſpeculum to receive the reflected horizontal beam, all the experiments of the darkened room are then performed as uſual.

This is a very ingenious conſtruction of a ſolar microſcope apparatus, but we fear too expenſive and troubleſome for common uſe. However, it is eaſy to ſee that this machine is capable of being greatly reduced; ſince it may be made to anſwer the end very well without a clock, and the ſpeculum may be glaſs inſtead of metal, and all fixed in one pedeſtal. See the article MICROSCOPE.

HELIOPTROPE, in natural hiſtory, a large bluiſh-green jaſper, with red variegations. See the article JASPER.

HELIOTROPIUM, turnſole, in botany, a genus of plants whoſe flower is monopetalous and ſaucer-ſhaped; the tube is the length of the cup; the limb is plane, divided lightly into five ſegments, and obtuſe: the ſmaller ſegments ſtand alternate and are acute; the larger are placed between: the mouth is cloſed by five prominent ſquamulæ, joined in the form of a ſtar, there is no pericarpium, the calyx remains unaltered, and contains four oval acuminated ſeeds.

A decoction of common turnſole purges phlegm and bile. It is good againſt the ſting of ſerpents: the leaves are ſaid to take away warts, ulcers, gangrenes, and ſcrophulous tumours.

HELIX, in geometry, the ſame with a ſpiral line.

The word is Greek, ελιξ, a wreath, or winding, and derived from ειλεω, or ελισσω, to environ.

HELIX, in architecture. Some diſtinguiſh between it and ſpiral. Daviler ſays a ſtaircaſe is helical, when the ſteps wind round a cylindrical newel; whereas the ſpiral winds round a cone, continually approaching nearer its axis. Helix alſo denotes, in architecture, the caulicules or little volutes under the flower of the Corinthian capital, called likewiſe urillæ.

HELIX, in anatomy, the external circle or border of the ear, in contradiſtinction to the inner protuberance correſponding thereto, called the anthelix. See EAR.

HELL, *Gehenna*, *Tartara*, *Hades*, *Infernus*, &c. the place of divine puniſhment after death, in contradiſtinction to heaven. See the article HEAVEN.

As all religions have ſuppoſed a future ſtate of exiſtence after this life, ſo all have their hell or place of torment, in which the wicked are ſuppoſed to be puniſhed. The hell of the ancient heathens was divided into two manſions, the one called Elyſium, on the right hand, pleaſant and delightful, appointed for the ſouls of good men; and the other called Tartara, on the left, a region of miſery and torment, appointed for the wicked. The latter was only hell in the preſent reſtrained ſenſe of the word. See the article ELYSIUM.

HELLEBORUS, black hellebore, in botany, a genus of plants, whoſe flower is roſaceous, and conſiſts of five large roundiſh obtuſe petals, with a great number of capillary ſtamina. The fruit is compoſed of ſeveral bicarinate compreſſed capſules, containing a number of round ſeeds fixed to the ſurture.

The common ſort grows naturally in ſeveral parts of England; but the true black hellebore, or Chriſtmas flower, grows on the Alps and Apennine mountains; it is a low perennial plant, without any other ſtalk than the pedicles of the leaves and flowers; the leaves are divided, quite to the pedicle, into ſeven or eight ſmooth firm ſegments, indented about the middle to the extremity, and flowers with us in January.

Black hellebore root is compoſed of many thick fleſhy fibres, black without and white within, of an acrid bitteriſh taſte; the ſmell, while freſh, is exceeding ſtrong. This taken inwardly proves a cathartic, and is reckoned good in melancholic and atrabilarious diſorders; it is found particularly ſerviceable againſt obſtinate ſuppreſſions of the menſtrual purgations, in plethoric habits, and ſanguine conſtitutions, where chalybeates are ineffectual or injurious.

White HELLEBORE, in botany. See the article VERATRUM.

HELLENISM, a ſort of Græciſm; a phraſe peculiarly adapted to the genius of the Greek tongue.

Helleniſm is diſtinguiſhed from Græciſm; in that the former is not applied to authors who have wrote in Greek, but to thoſe who, writing in ſome other language, uſe terms peculiar to the Greek.

HELLENISTIC, or HELLENISTIC LANGUAGE, that ſpoken among the Helleniſts.

HELM, in the marine, an engine of wood hung on the outſide of a ſhip behind, upon certain goggings bolted to the ſtern-poſt, upon which it revolves, and by its motion directs the courſe of the ſhip at ſea.

The helm is compoſed of two or three parts, viz. the rudder, the tiller, and the wheel; this laſt part however is ſeldom uſed but in men of war, and the largeſt merchant-ſhips.

The rudder is that part of the helm which is hung on the outſide of the ſtern-poſt, as before deſcribed: in the top of the rudder there is a mortice cut, into which is firmly bolted the tiller, which is a piece of timber thruſt into the rudder to turn it; and, laſtly, the wheel is employed to move the tiller with greater facility from one ſide to the other, in directing a ſhip.

HELMET, an ancient defenſive armour worn by horſemen, both in war and in tournaments. It covered both the head and face, only leaving an aperture in the front ſecured by bars, which was called the viſor.

HELONIAS, in botany, a genus of plants, whoſe flower conſiſts of ſix oblong equal petals, with the ſame number of ſtamina. The fruit is a roundiſh capſule, having three cells, each containing a roundiſh ſeed.

HELVE, a term uſed among country people for the handle of a hatchet, pick-ax, mattock, or the like.

HEMEROCALLIS, day lilly, in botany, a genus of plants, whoſe flower conſiſts of an infundibuliform-campanulated corolla; the tube is ſhort, the limb patent, and divided into ſix reflexed ſegments. The fruit is an oval three-cornered capſule, containing three cells, which are filled with roundiſh ſeeds.

This genus includes the lilio-aſphodelus of Tournefort.

HEMERODROMI, in Grecian antiquity, centinels and guards appointed for the ſecurity and preſervation of cities and other places.

HEMICRANIA, in medicine, a ſpecies of headach, wherein only one half or ſide of the head is affected.

HEMICYCLE, in architecture, is defined by Daviler to be an arch forming a perfect ſemicircle. See the articles ARCH and BRIDGE.

To conſtruct ſuch an arch of hewn ſtone, they divide hemicycle into a certain number of equal parts, and faſhion an equal number of vouſoirs, which will complete the arch: however, that there may be no joint in the middle, where the key-ſtone ſhould be, they always take care that the number of vouſoirs be an odd one.

HEMICYCLIUM, in antiquity, a part of the orcheſtra in the ancient theatres.

HEMICYCLIUM alſo ſignified a kind of ſun-dial; being a concave ſemicircle, the upper cuſp of which looked to the north. On the middle of the hemicyclium ſtood a ſtyle, whereof the point that correſponded to the center of the hemicycle, repreſented the center of the earth; and its ſhadow, being

ing projected on the concavity of the hemicycle, which repreſented the ſpace between the two tropics, pointed out not only the declination of the ſun, and the day of the month, but likewiſe the hour of the day.

HEMINA, in Roman antiquity, a liquid meaſure, which, according to Arbuthnot, was equal to half a wine-pint Engliſh meaſure; its contents being 2,818 ſolid inches. See the article MEASURE.

HEMIONITIS, mules fern, in botany, a genus of plants, of which there are ſeveral ſpecies; the fructifications of this genus are arranged into lines, ſometimes branched, often uniting and interſecting one another.

HEMISPHERE, *Hæmiſpherium*, in geometry, the half of a globe or ſphere, when divided into two by a plane paſſing through its center.

The word is Greek, and compounded of ημισυς, half, and σφαιρα, a ſphere.

The center of gravity of a hemiſphere is $\frac{5}{8}$ of the radius diſtant from the vertex. It is proved in optics, that a glaſs hemiſphere unites the parallel rays at the diſtance of a diameter and one third of a diameter from the pole of a glaſs

HEMISPHERE, in aſtronomy, particularly denotes one half of the mundane ſphere. The equator divides the ſphere into two equal parts, called the northern and ſouthern hemiſpheres, having the north and ſouth poles in their reſpective zeniths. The horizon alſo divides the ſphere into two hemiſphere, the upper and lower, having the zenith and nadir in their reſpective vertices.

HEMISPHERE alſo denotes a projection of half the terreſtrial globe, or half the celeſtial ſphere on a plane, and is frequently called planiſphere.

HEMISPHEROIDAL, in geometry, an appellation given to whatever approaches to the figure of an hemiſphere, but is not exactly ſo.

HEMISTICH, ημιϛιχος, in poetry, denotes half a verſe, or a verſe not compleated.

In reading common Engliſh verſes, a ſhort pauſe is required at the end of each hemiſtich, or half verſe.

HEMITONE, in the ancient muſic, what we now call a half note or ſemitone.

HEMITRITÆUS, in medicine, a kind of fever, denoting the ſame as ſemi-tertian, returning twice every day.

The word is Greek, and compounded of ημισυς, half, and τριταιος, third or tertian.

HEMLOCK. See CONIUM.

Water HEMLOCK. See CICUTA.

HEMP, *Cannabis*, in botany, a very uſeful plant for making cordage, and all things of that kind.

The ſtalks of hemp grow to be five or ſix feet high, angular, and covered with a ſtrong tough bark; and cloathed with many digitated leaves, each compoſed of five, ſix, or ſeven parts, long and narrow, ſharp-pointed and ſerrated about the edges, the middlemoſt being longeſt, ſet together upon one foot-ſtalk; they are green above and hoary underneath, and rough in handling. The flowers, in that they call the male, grow towards the top of the ſtalk in bunches, ſmall and ſtaminous, which periſh without bringing any ſeed, which is produced by the female without any previous flowers.

Hemp is an uſeful plant, purchaſed at a dear rate from foreigners, when it might be cultivated among ourſelves, to the great benefit of the nation in general. It delights in warm, ſandy, or ſomewhat gravelly ſoil; but it muſt be ſomewhat rich and of a good depth. The beſt ſeed is that which is brighteſt, and retains its colour and ſubſtance in rubbing. Three buſhels will ſow an acre; but the richer the land is, the thicker it muſt be ſown, and the poorer it is, the thinner. The time of ſowing it, is from the latter end of March, to the end of April, according as the ſpring falls out; but the earlier it is ſown the better. If it be a dry ſeaſon, great care muſt be taken to preſerve it from birds.

The firſt ſeaſon for gathering it is about Lammas, when a good part of it will be ripe; that is, the light ſummer hemp which bears no ſeed, and is called fimble-hemp. When it is ripe, the ſtalks grow white, and the leaves fall downwards, turning yellow at the top; it muſt then be pulled up, dried, bound up in bundles as big as may be graſped in both hands, and laid by for uſe. Care muſt be taken not to break what is left ſtanding, becauſe it is to grow till near Michaelmas before it will be fit to gather: this is uſually called karle-hemp. When it is gathered, lay it in the ſun three or four days to dry, and then ſtack or houſe it till the ſeed be threſhed out.

An acre of hemp, in the beſt land, commonly yields about two or three quarters of ſeed, which, with the hemp unwrought, is often worth from 5 to 8 l. but if wrought, from 10 to 12 l. but the fimble-hemp is not worth above half as much as the other.

As to the method of preparing it, after the ſeeds are threſhed out of the heads, and the ſtalks are laid up in bundles, and ſteeped in a ſtanding water, the cleaner it is the better; they are faſtened to poles, and left to ſoak about fifteen days; and when the ſubſtance of the ſtalk is almoſt rotten, the bundles are taken out and well dried. But flax, inſtead of being ſteeped in water, is uſually expoſed alternately to the moiſt air of the night, and the heat of the ſun, by which means it receives a finer colour.

When hemp and flax are well penetrated and afterwards completely dried, they are bruiſed by handfuls on a block, with a kind of mallet; all the bullen, which is the inward ſubſtance of the ſtem, flies off in ſhivers, by the force of the blows, and nothing remains in the hands of the beater but the thin bark in large threads, through the whole length of the ſtem. This parcel of threads is afterwards hung on a perpendicular board, and bruiſed with a wooden beetle, in order to ſhake out all the litttle ſtraws that may happen to remain of the bullen. All the groſs parts are now ſeparated from the ſtem, and the threads of the bark receive their perfection from the comb or hatchel. See the article Hatchel.

The refuſe of this combing, which conſiſts of all the threads which are too thick, is called tow, for the uſe of which ſee the article Tow.

HEN, *Gallina*, in ornithology, though uſed in a general ſenſe to ſignify any female bird, is more particularly reſtrained to thoſe of the order of gallinæ.

Hen-Bane, a plant called by botaniſts hyoſciamus. See Hyosciamus.

Hen-Mould, among farmers, denotes a black ſpungy ſoil, fitter for grazing than for corn.

In ſome places, indeed, they give the name of hen-mould to a rich black earth mixed with whitiſh ſtreaks, which is exceeding fertile.

HENTING, among farmers, a method of ſowing immediately before the plough, by which, it is pretended, a great deal of charge is ſaved. See Plowing.

Henting Furrows, thoſe turned from each other at the bottom, in plowing ridges. See the article Plowing.

HEPAR, the liver, in anatomy. See Liver.

HEPATIC, in medicine and anatomy, any thing belonging to the liver.

Hepatic Aloes. See Aloes.

Hepatic Vein. See Basilica.

HEPATICA, noble liverwort, in botany, a low plant, without any other ſtalk than the pedicles of the leaves and flower; the leaf is cut, not very deep, into three lobes, entire about the edges; the flower is commonly blue, ſometimes reddiſh or white, hexapetalous, ſet in a three-leaved cup, with numerous ſtamina in the middle, which are followed by a cluſter of whitiſh ſeeds. It is perennial, grows wild on gravelly ſhady grounds in Germany and other parts of Europe, and flowers in our gardens in March or ſooner.

This herb is a mild reſtringent and corroborant; in which intentions, infuſions of it have been drank as tea, or the powder of the dry leaves given to the quantity of half a ſpoonful at a time.

Hepatica, liverwort, in botany, a ſpecies of moſs, conſiſting of numerous obtuſely laciniated leaves, lying over one another, marked on the ſurface with white tubercles reticularly diſpoſed through the green ſubſtance of the leaf, ſhooting out underneath fine capillary roots: from the extremities of the leaves iſſue clear whitiſh pedicles, bearing globular bodies, which when ripe contain black minute ſeeds like duſt. It is perennial, grows on moiſt ſtony places, and runs up to ſeed in March or April.

This moſs is recommended as an aperient, reſolvent, and purifier of the blood. From the penetrating though mild pungency and bitteriſhneſs of its taſte, ſinking as it were into the tongue, it promiſes to be a plant of no inconſiderable virtue, tho' in this country at preſent diſregarded.

HEPATITIS, in medicine, an inflammation of the liver, with an impoſthume of that organ. It bears a near reſemblance to the pleuriſy, only its ſymptoms are not ſo intenſe. It commonly either kills the patient or ſuppurates gradually, or degenerates into a ſchirrhus.

HEPHÆSTIA, in Grecian antiquity, an Athenian feſtival in honour of Vulcan, the chief ceremony of which was a race with torches.

HEPTACHORD, in the ancient poetry, ſignified verſes that were ſung or played on ſeven chords, that is, on ſeven different notes. In this ſenſe it was applied to the lyre, when it had but ſeven ſtrings.

HEPTAGON, in geometry, a figure conſiſting of ſeven ſides and as many angles.

The word is Greek, and compounded of εϖτα, ſeven, and γωνια, an angle.

If the ſides be all equal, it is called a regular heptagon.

HEPTAGONAL Numbers, are a ſort of polygonal numbers, wherein the difference of the terms of the correſponding arithmetical progreſſion is 5.

One of the properties of theſe numbers is, that if they be multiplied by 40, and 9 be added to the product, the ſum is a ſquare number.

HEPTAMERIS, in muſic, the ſeventh part of a meris, being, according to M. Sauveur, the forty-third part of the octave, See the article Octave.

HEPTANDRIA, from επτα, ſeven, and ανηρ, male, the name of the ſeventh claſs in the Linnæan ſyſtem of botany, comprehending thoſe plants whoſe flowers are hermaphrodite, and furniſhed with ſeven ſtamina, or male parts, in each.

Of this claſs are the horſe-cheſnut, trientalis, &c.

HEPTANGULAR, in geometry, an appellation given to figures which have ſeven angles.

HEPTARCHY, a government conſiſting of ſeven perſons, or a country divided into ſeven kingdoms.

The word is Greek, and formed of επτα, ſeven, and αϱχη, rule.

The Saxon heptarchy included the ſouthern and northern parts of England, which was cantoned into ſeven petty kindoms, as thoſe of Kent, South-Saxons, Weſt-Saxons, Eaſt-Saxons, Northumberland, the Eaſt-Angles, and Mercia. The heptarchy was formed by degrees from the year 457, when the kingdom of Kent was firſt erected, and terminated in 805, when king Egbert re-united them into a monarchy.

HEPTATEUCH, in literature, a volume conſiſting of ſeven books.

The word is Greek, and compounded of επτα, ſeven, and τευχος, a book or work.

Heptateuch chiefly denotes the five books of Moſes, called the Pentateuch, together with the two following books, Joſhua and Judges.

HERACLEONITES, a ſect of Chriſtians, the followers of Heracleon, who refined upon the Gnoſtic divinity, and maintained that the world was not the immediate production of the Son of God, but that he was only the occaſional cauſe of its being created by the Demiurgus. The Heracleonites denied the authority of the prophecies of the Old Teſtament, maintaining that they were mere random ſounds in the air; and that St. John the Baptiſt was the only true voice that directed to the Meſſiah.

HERACLEUM, cow-parſnip, in botany, a genus of umbelliferous plants, the general flower of which is difform and radiated; the ſingle flowers of the diſc conſiſt each of five equal petals, but thoſe of the radius conſiſt of five unequal petals. The fruit is elliptic, compreſſed, and ſtriated on each ſide, in the middle, and contains two oval compreſſed ſeeds.

The genus includes the ſphondylium of Tournefort.

HERACLIDÆ, or *Return of the* Heraclidæ *into Peloponneſus*, in chronology, a famous epocha, that conſtitutes the beginning of profane hiſtory; all the time preceding that period being accounted fabulous.

This return happened in the year of the world 2862, an hundred years after they were expelled, and eighty after the deſtruction of Troy.

HERALD, an officer at arms, whoſe buſineſs it is to declare war, to proclaim peace, to marſhal all the ſolemnities at the coronation, chriſtening, marriage, and funeral of princes, to blazon and examine coats of arms, &c.

The three chief heralds are called King's at Arms, the principal of which is Garter; the next is called Clarencieux, and the third Norroy; theſe two laſt are called provincial heralds.

Beſides theſe, there are ſix other inferior heralds, viz. York, Lancaſter, Somerſet, Richmond, Cheſter, and Windſor; to which, on the coming of king George I. to the crown, a new herald was added, ſtyled Hanover herald; and another, ſtyled Gloceſter king at arms.

The kings at arms, the heralds, and four purſuivants, are a college or corporation, erected by a charter granted by Richard III. by which they obtained ſeveral privileges, as to be free from ſubſidies, tolls, and all troubleſome offices.

HERALDRY, the art of armoury and blazoning, which comprehends the knowledge of what relates to ſolemn cavalcades and ceremonies at coronations, inſtalments, the creation of peers, nuptials, funerals, &c. and alſo whatever relates to the bearing of arms, aſſigning thoſe that belong to all perſons, regulating their right and precedencies in point of honour, and reſtraining thoſe who have not a juſt claim from bearing coats of arms that do not belong to them. See Blazoning, Arms, Shield, Bearing, &c.

HERB, a denomination common to all plants, whoſe ſtalks die every year, after their ſeed is ripe.

The word is derived from the Latin *herba*, which ſignifies the ſame thing.

There are ſome herbs whoſe root periſhes with the ſtem, and others where the root ſurvives the ſtem by ſeveral years. The former are called annuals: thoſe which only bear flowers and fruit the ſecond year, or even the third, and then periſh, are called biſannuals. Herbs whoſe roots do not periſh after they have ſhed their ſeed, are called perannuals, and, if they keep their leaves all the year round, they are called ever-greens. Herbs are alſo diſtinguiſhed into kitchen, ſallad, and medicinal herbs.

Herb-Christopher. See Actoea.

HERBAGE, in law, ſignifies the paſture provided by nature for the food of cattle; alſo the liberty to feed cattle in the foreſt, or in another perſon's ground.

HERBAL, in literary hiſtory, a book that treats of the claſſes, genera, ſpecies, and virtues of plants.

Herbal is ſometimes uſed alſo for what is more uſually called hortus ſiccus.

HERBALIST, the author of an herbal, or one who is ſkilled in plants.

HERBIVOROUS Animals, thoſe which feed only on vegetables.

HERCULES, in aſtronomy, one of the conſtellations in the northern hemiſphere. See the article Constellation.

HERD, a company of eatable cattle of the larger ſort, as cows, oxen, ſwine, deer, &c. alſo of wild beaſts.

HEREDITAMENTS, whatever immoveable things a perſon may have to himſelf and his heirs, by way of inheritance; and which, if not otherwiſe bequeathed, deſcend to him who is next heir, and not to the executor, as chattels do.

This word extends to whatever is inheritable, be it real, perſonal, or mixed; and in conveyances, by the grant of hereditaments, manors, houſes, lands, rents, &c. will paſs.

HEREDITARY, an appellation given to whatever belongs to a family by right of ſucceſſion, from heir to heir.

HERESY, the crime of obſtinately perſiſting in opinions that are contrary to the fundamentals of religion.

HERETIC, a general name for all ſuch perſons under any religion, but eſpecially the Chriſtian, as profeſs or teach religious opinions contrary to the eſtabliſhed faith, or to what is made the ſtandard of orthodoxy.

HERISSON, in fortification, a beam armed with a great number of iron ſpikes, with their points outwards, and ſupported by a pivot, on which it turns.

Theſe ſerve as a barrier to block up any paſſage, and are frequently placed before the gates, and more eſpecially the wicket doors of a town or fortreſs, to ſecure thoſe paſſages, which muſt of neceſſity be often opened and ſhut.

HERMANNIA, in botany, a genus of plants whoſe flower is pentapetalous and twiſt againſt the ſun; the ſtamina are five broad filaments, topped with erect acuminated antheræ. The fruit is a roundiſh pentagonal capſule, with five cells, containing a number of ſmall ſeeds.

HERMAPHRODITE, one who partakes of both ſexes.

The word is Greek, Ερμαφροδιτος, and compounded of Ερμης, Mercury, and Αφροδιτη, Venus, as being a mixture of Mercury and Venus, that is, of male and female.

Moſt, if not all thoſe reported to be hermaphrodites, are probably no other than mere women, whoſe clitoris is grown to an exorbitant ſize, and whoſe labia pudendorum are become preternaturally tumid.

Among the inſect claſs of animals, indeed, hermaphrodites are very frequent: ſuch are worms, ſnails, leeches, &c.

HERMAPHRODITE FLOWERS, among botaniſts, are thoſe which contain both the male and female organs of generation; theſe are by far the moſt numerous.

HERMATHENA, among antiquarians, a ſtatue repreſenting Mercury and Minerva both in one.

HERMETIC, or HERMETICAL, an appellation given to whatever belongs to chemiſtry, from Hermes Triſmegiſtus, who is ſuppoſed to have been its inventor.

HERMETICAL PHILOSOPHY, that which undertakes to ſolve all the phænomena of nature from the three chemical principles, ſalt, ſulphur, and mercury. A conſiderable addition was made to the ancient hermetical philoſophy by the modern doctrine of alkali and acid. See ALKALI.

HERMETICAL PHYSIC, the art of healing, as founded on the hermetical philoſophy.

HERMETICAL SEAL, a method of ſtopping glaſs-veſſels for chemical operations ſo very accurately, that nothing can eſcape. It is done by heating the neck of the veſſel in the flame of a lamp, till it be ready to melt, and then twiſting it cloſe together with a pair of pincers.

Veſſels may likewiſe be ſealed hermetically, by ſtopping them with a plug of glaſs well luted into the neck of the veſſel; or by inverting another ovum philoſophicum over that wherein the matter is contained.

HERMIT, a devout perſon retired into ſolitude to be more at leiſure for prayer and contemplation.

The word is derived from the Greek, ερημος, a wilderneſs.

HERMODACTYL, in pharmacy, the root of an unknown plant, brought from Turky, of the ſhape of a heart flatted; of a white colour; compact and ſolid, yet eaſy to cut or powder. It is not now known in practice.

HERNANDIA, in botany, a genus of plants producing male and female flowers on the ſame plant; the corolla of the male as well as the female is divided into ſix ſegments; when the flower is decayed, the cup becomes a large inflated oblong fruit, perforated at each end, containing a hard globoſe nut lightly depreſſed.

We know only one ſpecies of this genus, which is the hernandia, with a large umbilicated ivy-like leaf, commonly called, in the Weſt-Indies, Jack in a box.

HERNIA, in medicine, a tumor formed by the deſcent of the inteſtines or omentum out of their place: it is popularly called a rupture.

HERNIARIA, rupture-wort, in botany, a genus of plants whoſe flower is apetalous, but conſiſts of a monophyllous-coloured cup cut into five ſpreading ſegments, and is perſiſtent. The fruit is a ſmall capſule placed in the bottom of the cup, and contains a ſmooth oval pointed ſeed.

A ſpecies of this genus, called herniaria glabra or ſmooth rupture-wort (which grows naturally in ſome parts of England) is recommended by Schroder in a diabetes: he ſays, it helps to diſſolve the ſtone, and abſterges the mucus from the ſtomach and other parts; but its chief uſe is in plaiſters and ointments, to be applied outwardly againſt ruptures.

HERO, in the ancient mythology, a great and illuſtrious perſon, of a mortal nature, though ſuppoſed by the populace to partake of immortality; and, after his death, placed among the number of the gods.

Heroes were perſons partly of divine and partly of human extraction, being begot between a deity and a mortal, and coincides with what we otherwiſe call a demi-god; ſuch was Hercules, who was the ſon of Jupiter by Alcmena: accordingly Lucian deſcribes a hero to be a medium between a god and man, or rather a compoſition of both.

HERO is alſo uſed in a more extenſive ſenſe for a great, illuſtrious, and extraordinary perſonage; particularly in reſpect of valour, courage, intrepidity, and other military virtues.

HERO *of a Poem, or Romance,* is the principal perſonage, or character therein. See the article CHARACTER.

The hero of the Iliad is Achilles; of the Odyſſe, Ulyſſes; of the Æneid, Æneas; of Taſſo's Jeruſalem, Godfrey of Bulloign; of Milton's Paradiſe Loſt, the Meſſiah; though Mr. Dryden will have the Devil to be Milton's hero, in regard he gets the better of Adam, and drives him out of Paradiſe.

HEROIC, ſomething belonging to a hero, or heroine: thus,

HEROIC AGE, that age or period of the world wherein the heroes are ſuppoſed to have lived. The heroic age coincides with the epic poem. See EPIC.

HEROIC VERSE, that wherein heroic poems are uſually compoſed; or it is that proper for ſuch poems. In the Greek and Latin, hexameter verſes are uſually denominated heroic verſes, as being alone uſed by Homer, Virgil, &c. See the article HEXAMETER.

Alexandrine verſes of twelve ſyllables were formerly called heroic verſes; but latter writers uſe verſes of ten ſyllables.

HEROINE, a woman of an heroic ſpirit, or who makes the principal perſonage in an heroic poem. See HERO and POEM.

HERON, in ornithology, a bird of the ardea-kind, with a hanging creſt.

HERPES, in medicine, a bilious puſtule, which breaking out in different manners upon the ſkin, accordingly receives different denominations.

If they appear ſingle, as they frequently do in the face, the baſe is inflamed, and the top pointed; and having diſcharged a drop of matter, the redneſs and pain go off, and they dry away. There is another ſort more corroſive and of greater malignity, when a cluſter of puſtules riſe in a ring, accompanied with ſmart, and ſometimes with great itching; this ſpecies is termed ſerpigo, and vulgarly the tetter or ring-worm.

Another kind of this diſeaſe appears in large cluſters upon the neck, breaſt, loins, &c. attended with a ſlight fever and inflammation. The heads are white and mattery, which are ſucceeded by a ſmall round ſcab reſembling millet ſeed, whence its name, and vulgarly called ſhingles. See the article ERYSIPELAS.

HERRING, in ichthyology, a ſpecies of clupea, with the lower jaw longeſt, and without any black ſpots. It is from five to eight inches in length, and between one and two in breadth.

HERRING *Fiſhery.* Herrings are chiefly found in the North ſea. They are a fiſh of paſſage, and commonly go in ſhoals, being very fond of following fire or light, and in their paſſage they reſemble a kind of lightning. About the beginning of June, an incredible ſhoal of herrings, probably much larger than the land of Great-Britain and Ireland, come from the north on the ſurface of the ſea; their approach is known by the hovering of a ſea fowl in expectation of prey, and by the ſmoothneſs of the water; but where they breed, or what particular place they come from, cannot be eaſily diſcovered. As this great ſhoal paſſes between the ſhores of Greenland and the north cape, it is probably confined, and as it reaches the extremities of Great-Britain, is neceſſarily divided into two parts. For we find one part of the herrings ſteering weſt, or ſouth-weſt, and leaving the iſlands of Shetland and Orkney to the left, paſs on towards Ireland, where being interrupted a ſecond time, ſome keeping the ſhore of Britain, paſs away ſouth down St. George's channel; while the other part, edging off to the ſouth-weſt, coaſt the weſtern ocean, till they reach the ſouth ſhore of Ireland, and then ſteering ſouth-weſt, join the reſt in St. George's channel. The other part of the firſt diviſion made in the north, parting a little to the eaſt and ſouth-eaſt, paſs by Shetland, and then make the point of Buchan-neſs, and the coaſt of Aberdeen, filling as they go, all the bays, firths, creeks, &c. with their innumerable multitudes. Hence they proceed forward, paſs by Dunbar, and rounding the high ſhores of St. Abbe's Head, and Berwick, are ſeen again off Scarborough; and even then not diminiſhed in bulk, till they come to Yarmouth roads, and from thence to the mouth of the Thames, after which, paſſing down the Britiſh Channel, they ſeem to be loſt in the Weſtern ocean.

There is nothing particular in the manner of fiſhing. The nets wherein the fiſh are drawn, ſhould regularly have their meſhes an inch ſquare to let all the leſſer fry go through.

Curing and preparing HERRING. The commerce of herring, both white or pickled, and red, is very conſiderable. The white Dutch herrings are the moſt eſteemed, being diſtinguiſhed into four ſorts, according to their ſizes; and the beſt are thoſe that are fat, fleſhy, firm, and white, ſalted the ſame day they are taken with good ſalt, and well barrelled. The Britiſh herrings are little inferior, if not equal to the Dutch; for in ſpite of all their endeavours to conceal the ſecret, their method of curing, laſting, or caſking the herrings, has been diſcovered, and is as follows. After they have hauled in their nets, which they drag in the ſterns of their veſſels backwards and forwards in traverſing the coaſt, they throw them upon the ſhip's deck, which is cleared of every thing for that purpoſe: the crew is ſeparated into ſundry diviſions, and each diviſion has a peculiar taſk: one part opens and guts the herrings, leaving the melts and roes; another cures and ſalts them, by lining or rubbing their inſide with ſalt; the next packs them, and between each row and diviſion they ſprinkle handfuls of ſalt; laſtly, the cooper puts the finiſhing hand to all, by heading the caſks very tight, and ſtowing them in the hold. It is cuſtomary with us to waſh the herrings in freſh water, and ſteep them twelve or fifteen hours, in a ſtrong brine, before we proceed to barrel them.

Red HERRINGS muſt lie twenty-four hours in the brine, inaſmuch as they are to take all their ſalt there, and when they are taken out they are ſpitted, that is, ſtrung by the head on little wooden ſpits, and then hung in a chimney made for that purpoſe: after which, a fire of bruſh-wood, which yields a deal of ſmoke, but no flame, being made under them, they remain there till ſufficiently ſmoked and dried, and are afterwards barrelled up for keeping.

HERSE, in fortification, is a lattice or portcullice, made in the form of a harrow, and ſtuck full of iron ſpike.

It is uſually hung by a rope, faſtened to a moulinet, which is cut in caſe of a ſurprize, or when the the firſt gate is broken with a petard, to the end that it may fall and ſtop up the paſſage of the gate, or other entrance of a fortreſs.

Theſe herſes are alſo often laid in the roads, with the points upwards, to incommode the march both of the horſe and infantry.

HERSILLON, in the military art, a ſort of beam, &c. between ten and twelve feet long, whoſe two ſides are full of ſpikes, to incommode both horſe and foot.

The word is a diminitive of the preceding.

HESPER, *Heſperus*, in aſtronomy, the evening ſtar, Venus being ſo called when ſhe ſets after the ſun.

The word is Greek, Εσπερος, the brother of Atlas, and father of the Heſperides.

HESPERIDES, in the ancient mythology, were the daughters of Heſperus, which were three in number, Ægle, Arethuſa, and Heſperethuſa. They are repreſented by the ancients as having the keeping of certain golden apples on the other ſide the ocean. The poets aſſign them a dragon to watch the fruit: this dragon Hercules ſlew, and carried off the apples.

HESPERIS, dame's violet, in botany, a genus of plants, whoſe flower is tetrapetalous and cruciform; the ſtamina are ſix ſubulated filaments (two of which are ſhorter than the reſt) theſe are topped with linear erect antheræ. The fruit is a plain oblong compreſſed bilocular pod, with two valves, containing many ovated compreſſed ſeeds.

HETEROCLITE, among grammarians, one of the three variations in irregular nouns, and defined by Mr. Ruddiman a noun that varies in declenſion; as *hoc vas*, *vaſis*; *hæc vaſa*, *vaſorum*.

Other grammarians take the word heteroclite in a larger ſenſe, applying it to all irregular nouns.

HETERODOX, in polemical theology; any thing contrary to the faith and doctrines of a true church.

HETERODROMUS VECTIS, in mechanics, a lever, wherein the fulcrum, or point of ſuſpenſion, is placed between the power and the weight. See the article LEVER.

HETEROGENEOUS, or HETEROGENEAL, ſomething that conſiſts of parts of diſſimilar kinds, in oppoſition to homogeneous. See HOMOGENEOUS.

HETEROGENEOUS, in mechanics, ſuch bodies whoſe denſity is unequal in different parts of their bulk; or they are ſuch whoſe gravities in different parts are not proportionable to the bulks thereof: whereas bodies equally denſe or ſolid in every part, or whoſe gravity is proportionable to their bulk, are ſaid to be homogeneous.

HETEROGENEOUS LIGHT is, by Sir Iſaac Newton, ſaid to be that which conſiſts of rays of different degrees of refrangibility: thus the common light of the ſun or clouds is heterogeneous; being a mixture of all ſorts of rays.

HETEROGENEOUS NOUNS, one of the three variations in irregular nouns; or ſuch as are of one gender in the ſingular number, and of another in the plural.

HETEROGENEOUS QUANTITIES are thoſe which are of ſuch different kinds, as that one of them taken any number of times, never equals or excels the other.

HETEROGENEOUS SURDS are ſuch as have different radical ſigns, as $\sqrt[2]{a\,a}$, $\sqrt[5]{b\,b}$, $\sqrt[3]{9}$, $\sqrt[7]{18}$, &c. See SURD.

HETEROSCII, in geography, commonly denotes thoſe inhabitants of the earth in the temperate zones, whoſe ſhadow at noon is always projected the ſame way, either northward or ſouthward.

The word is Greek, and compounded of ετερος, different, and σκια, a ſhadow.

Heteroſcii however, ſtrictly denotes thoſe inhabitants which, during the whole year, have their noon-tide ſhadows projected different ways from each other. Thus the inhabitants of the northern temperate zone are heteroſcii with regard to thoſe of the ſouthern. The inhabitants of one part of the torrid zone are heteroſcii with regard to thoſe of the reſt, and to thoſe of one of the temperate zones, except at the ſolſtices; and even at that time, all of the torrid zone are heteroſcii with regard to thoſe of the temperate zones: but as the people of the torrid zone have their ſhadow now on this, and then on that ſide, they are called amphiſcii. See AMPHISCII.

HETEROUSIANS, a name compoſed of ετερος other, and ȣσια, ſubſtance; being given to a ſect of Arians, who did not believe that the Son of God was of a ſubſtance like to that of the Father, which was the opinion of another branch of the Arians, who were from thence called Hemoouſians; but that he was of another ſubſtance, different from that of the Father.

HEUCHERA, in botany, a plant which produces many cordated leaves of a lucid green, and crenated on their edges; from between theſe ariſeth the foot ſtalks of the flower, about a foot high, dividing at the top into a looſe panicle, ſuſtaining many quinquepetalous flowers of a dull purple-colour, which afterwards turns each to an ovate acuminated capſule, with two reflexed horns, and two cells filled with many ſmall ſeeds.

HEXACHORD, in ancient muſic, a concord called by the moderns a ſixth.

HEXAEDRON, *Hexahedron*, in geometry, one of the Platonic or five regular bodies, being a ſolid conſiſting of ſix equal ſides or faces, popularly called a cube.

The ſquare of the ſide of a hexaedron is in a ſubtriple ratio to the ſquare of the diameter of the circumſcribed ſphere. Hence the ſide of the hexaedron is to the ſide of the ſphere it is inſcribed in, as 1 to $\sqrt{3}$, and conſequently incommenſurable thereto.

HEXAGON, in geometry, a figure of ſix ſides, and as many angles.

If the ſides and angles be equal, it is called a regular hexagon. The ſide of a regular hexagon inſcribed in a circle is equal to the radius of that circle; hence a regular hexagon is inſcribed in a circle, by ſetting the radius off ſix times upon the periphery: As 1 to 1.672, ſo is the ſquare of the ſide of any regular hexagon to the area thereof nearly.

To deſcribe a hexagon on a given line A B (plate LX. *fig.* 2.) draw an equilateral triangle A B C, and the vertex C will be the center of a circle, which will circumſcribe the hexagon required.

HEXAMETER, in the Greek and Latin poetry, a verſe conſiſting of ſix feet.

The firſt four feet of a hexameter may be either dactyls or ſpondees; but the laſt foot ſhould in ſtrictneſs be a ſpondee, and the laſt but one a dactyl, as in Homer and Virgil.

HEXANDRIA, from *εξ*, ſix, and *ανηρ*, male, the name of the ſixth claſs in the Linnæan ſyſtem of botany, including all thoſe plants whoſe flowers are hermaphrodite, and furniſhed each with ſix ſtamina or male parts. To this claſs belong the lilly, narciſſus, tulip, aſparagus, aloe, garlic, with ſeveral other genera.

HEXAPETALOUS FLOWERS, among botaniſts, are thoſe whoſe corolla conſiſts of ſix petals or flower leaves.

HEXAPLA, in church-hiſtory, a work publiſhed by Origen, containing a part of the Old Teſtament in the original Hebrew, with ſeveral verſions of it in ſix columns; from whence it was called hexapla, or the ſix-fold edition.

HEXASTYLE, in architecture, a building with ſix columns in front.

HIATUS properly ſignifies an opening, chaſm, or gap; but it is particularly applied to thoſe verſes where one word ends with a vowel, and the following word begins with one, and thereby occaſion the mouth to be more opened, and the ſound to be very harſh.

HIBISCUS, in botany, a genus of plants whoſe flower conſiſts of a double perſiſtent calyx, containing a quinquepetalous cordated corolla. The ſtamina are compoſed of a number of filaments joined in a column, and terminated with reniform antheræ. The fruit is a quinquevalvular capſule with five cells, which contains ſeveral kidney-ſhaped ſeeds. — This genus includes the malvaviſcus of Dillenius, and the ketmia of Tournefort, a ſpecies of which is the well known ſhrub commonly called althæa frutex.

HICCUP, or HICCOUGH, *Singultus*, in phyſic, a ſpaſmodic, convulſive, interrupted, and uneaſy concuſſion of the diaphragm and ſome of the parts affixed to it, made in inſpiration, and accompanied with a ſonorous exploſion of the air through the mouth.

HIDE, the ſkin of beaſts, but particularly applied to thoſe of large cattle, as bullocks, cows, horſes, &c.

HIDE *of Land*, was ſuch a quantity of land as might be plowed with one plough within the compaſs of a year, or ſo much as would maintain a family; ſome call it ſixty, ſome eighty, and ſome an hundred acres.

HIDE-BOUND, among farriers, a diſtemper in horſes when the ſkin ſticks ſo faſt to the back and ribs, that the hand cannot ſeparate one from the other without great difficulty; his body is at the ſame time lean, his back-bones ſtand up, his guts are for the moſt part deficient in moiſture, and his dung dry and more offenſive than common.

If a horſe become hide-bound by hard riding and ill keeping, he may be cured by good keeping. If it be the effect of a fever, or ſome other diſeaſe, if that be cured which is the cauſe, the effect will ceaſe; but if he has no fever upon him, and he is hide-bound only from lowneſs of blood and ſpirits, give him boiled barley, white-water, or the like, and when his fleſh is raiſed, harden it with good oats, beans, and moderate exerciſe.

HIERACIUM, hawkweed, in botany, a genus of plants, whoſe flower is compound, uniform, and imbricated; the corollulæ are monopetalous, linear, legulated, and indented in five parts; at the extremity of the ſtamina are five very ſhort hairy filaments topped with cylindraceous antheræ; a pericarpium is wanting, but the cup, which is ovated and connivent, contains the ſeeds, which are ſolitary, four-cornered, ſhort, and winged with down.

HIERACITES, *Hieracitæ*, in church-hiſtory, Chriſtian heretics in the third century, ſo called from their leader Hierax, a philoſopher of Egypt; who taught that Melchiſedec was the Holy Ghoſt, denied the reſurrection, and condemned marriage: he likewiſe held, that no one could be ſaved who died before he arrived at years of diſcretion. The diſciples of Hierax taught that the Word, or Son of God, was contained in the Father, as a little veſſel is contained in a great one; from whence they had the name Metangimoniſts, from the Greek word *μεταγγιμονες*, which ſignifies contained in a veſſel.

HIERARCHY, among divines, denotes the ſubordination of angels. See the article ANGEL.

HIERARCHY likewiſe denotes the ſubordination of the clergy, eccleſiaſtical polity, or the conſtitution and government of the Chriſtian church, conſidered as a ſociety.

HIEROGLYPHICS, in antiquity, myſtical characters, or ſymbols, in uſe among the Egyptians, and that as well in their writing as inſcriptions; being the figures of various animals, the parts of human bodies, and mechanical inſtruments.

HIGH, *Altus*, a term of relation, importing one thing's being ſuperior or above another: thus we ſay, a high mountain, the high court of parliament, high relievo, &c.

HIGH, in muſic, is ſometimes uſed in the ſame ſenſe with loud, and ſometimes in the ſame ſenſe with acute.

HIGH-WATER, the ſtate of the tide when higheſt, or the time juſt before it begins to ebb. See the article TIDE.

HIGH-WAY, a free paſſage for the king's ſubjects, on which account it is called the king's highway, though the freehold of the ſoil belong to the lord of the manor, or the owner of the land.

HIGHNESS, a title given to princes. Before king James I. the kings of England had no other title but that of highneſs; which was alſo the caſe of the kings of Spain before Charles V.

At preſent all the ſons of crowned heads are ſtiled royal highneſs, as the electors of Germany are electoral highneſs.

HILARY-TERM, among lawyers. See TERM.

HILL, in the natural hiſtory of the earth. See MOUNTAIN.

Hills are of great uſe in a garden, as,

1. They ſerve as ſcreens to keep off the cold and nipping blaſts of the northern and eaſtern winds.

2. The long ridges and chains of lofty mountains, being generally found to run from eaſt to weſt, ſerve to ſtop the evagation of thoſe vapours towards the poles, without which they would all run from the hot countries, and leave them deſtitute of rain.

3. They condenſe thoſe vapours, like alembic heads, into clouds; and ſo, by a kind of external diſtillation, give origin to ſprings and rivers; and, by amaſſing, cooling, and conſtipating them, turn them into rain, and by that means render the fervid regions of the torrid zone habitable.

4. They ſerve for the production of a great number of vegetables and minerals, which are not found in other places.

It hath been found by experiment and calculation, that hills, though they meaſure twice as much as the plain ground they ſtand upon, yet the produce of the one can be no more than the other; and therefore, in purchaſing land, the hills ought not to be bought for more than their ſuperficial meaſure, i. e. to pay no more for two acres upon the ſide of an hill, than for one upon the plain, if the ſoil be equally rich.

It is true, that thoſe lands that are hilly and mountainous, are very different, as to their valuable contents, from what are found in flat and plain ground, whether they be planted, ſown, or built upon; as for example:

Suppoſe an hill contains four equal ſides, which meet in a point at the top; yet the contents of theſe four ſides can produce no more grain, or bear no more trees, than the plain ground on which the hill ſtands, or than the baſe of it; and yet by the meaſure of the ſides there may be double the number of acres, rods, and poles, which they meaſure on the baſe or ground-plot.

For as long as all plants preſerve their upright method of growing, hilly ground can bear no more plants in number than the plain at the baſe.

Again, as to building on an hill, the two ſides of an hill will bear no more than the ſame number of houſes than can ſtand in the line at the baſe.

And as to rails, or park-pailing over an hill, though the meaſure be near double over the hill to the line at the bottom, yet both may be incloſed by the ſame number of pales of the ſame breadth. *Miller's Gard. Dict.*

HIN, a Hebrew meaſure of capacity for things liquid, containing the ſixth part of an epha, or one gallon two pints, or two thouſand, five hundred and thirty-three ſolid inches, Engliſh meaſure.

HINE, a female ſtag in the third year of its age.

HIND CALF, a male hart, or hind, in the firſt year. She fawns in April or May.

HIND, or HINE, a huſbandman's ſervant. Thus a perſon who overſees the reſt, is called the maſter-hine.

HINGES, in building, thoſe iron-joints, whereby doors, tables, &c. open, ſhut, or fold, &c. Of theſe there are various ſpecies.

HIP, dog-roſe, a ſpecies of wild briar, with ſingle pentapetalous flowers, of a whitiſh colour, mixed with various ſhades of red. It is one of the largeſt plants of the roſe kind; grows wild in hedges; and flowers, as the garden ſorts, in June.

The fruit, the only part of the dog-roſe made uſe of in medicine among us, is agreeably dulco-acid, and ſtands recommended as a cooling reſtringent, in bilious fluxes, ſharpneſs of urine, and hot indiſpoſitions of the ſtomach: the freſh pulp is made in the ſhops into a conſerve, by mixing three ounces of it with five of fine ſugar. The pulp ſhould be ſeparated with great care from the rough prickly matter which incloſes the ſeeds; a ſmall quantity of which, retained in the conſerve, is apt to occaſion an uneaſineſs at the ſtomach, pruritus about the anus, and ſometimes vomiting.

HIP-GOUT, *Sciatica.* See the articles GOUT and SCIATICA.

HIP-MOULD is by ſome uſed for the back of the hip, but others underſtand it to mean the prototype or pattern, commonly made of a thin piece of wainſcot, by which the back and ſides of the hip are ſet out.

Hip-Roof, among carpenters, called alſo Italian roof, is a roof which has neither gable-head, ſhread-head, nor jerken-head, by which is meant ſuch heads as are both gable and hip at the ſame end; for it is a gable or upright as high as the collar-beam, and then there are two ſhort hips, which ſhut up with their tops to the tops of a pair of rafters, which country carpenters call ſinglars. A hip-roof has rafters as long, and with the angles of the foot, &c. at the ends of the buildings, as it has at the ſides; and the feet of the rafters at the ends of ſuch buildings as have hip-roofs, ſtand on the ſame plane, viz. parallel with the horizon, and at the ſame height from the foundation, with rafters on the ſides of the roof.

HIPPOCAMPUS, the ſea-horſe, in ichthyology, the ſquare-bodied ſyngnathus, with no fin at the tail. It is five inches long, and where thickeſt, about an inch in diameter; the head is long, ſlender, and compreſſed, forming a kind of ſnout; the body is of a quadrangular figure, but the diviſions are not equal, and in the thickeſt part it is hexangular or heptangular.

It is a very ſingular and rare fiſh; the tail of which uſually curls up in the drying, and its head being bent down, gives it a rude reſemblance to a horſe; whence the name.

HIPPOCASTANUM, horſe-cheſnut, in botany. See Horse-Chesnut.

HIPPOCENTAUR, in antiquity, a fabulous animal, half man half horſe.

What gave riſe to the fable of hippocentaurs, was this. The Theſſalians are ſaid to have been the firſt inventors of the art of breaking horſes; and being firſt ſeen on horſeback, they ſeemed to make but one body with the horſes; whence the origin of the fable.

HIPPOCRAS, an infuſion of aromatic powders in wine, which is afterwards edulcorated with ſugar and honey; being ſo called becauſe that, when the infuſion is finiſhed, it is ſtrained through Hippocrates's ſleeve.

It is prepared of various aromatics and other ingredients, according to the different intentions to be anſwered.

HIPPOCRATES's Sleeve, a kind of filtre or ſtraining bag formed by joining the oppoſite angles of a ſquare piece of flannel in form of a pyramid, and uſed to ſtrain ſyrups, decoctions, &c. for clarification.

HIPPOCREPIS, horſe-ſhoe vetch, in botany, a genus of plants producing papilionaceous flowers; the vexillum of each is cordated with a narrow baſe the length of the cup, the carina is lunulated and compreſſed, and the alæ are oval, oblong, and blunt. The fruit is a compreſſed pod, very long reflexed, and jointed like a horſe-ſhoe; the ſeed is ſingle in each joint, of an oblong and incurved figure.

HIPPODROME, in antiquity, the courſe where horſe-races weer performed.

HIPPOMANES, the manchineel tree, in botany. See Manchineel.

HIPPOPHÆ, ſea-buckthorn, in botany, a genus producing male and female flowers on different plants; having no corolla, the cup of the male flower is divided into two parts, as is alſo the calyx of the female. The fruit is a globoſe unilocular berry, incloſing a roundiſh ſeed.

HIPPOPOTAMUS, the river horſe, a genus of quadrupeds, of the order of the jumenta, the characters of which are theſe: the fore-teeth of the upper jaw are four, and placed in pairs; thoſe of the lower jaw are prominent, and the intermediate ones are protended forward: the canine teeth are ſingle, and obliquely truncated; the teats are only two, and placed near the groin.

The hippopotamus is a native of Africa, paſſing a great part of its time under water, in the rivers of the Nile and Niger; but comes on ſhore to ſleep and breed. It is a large unwieldy animal, as big as an ox.

HIPPURIS, in botany, a genus of plants, whoſe flower has neither calyx, corolla, or perianthium, but conſiſts of a ſingle filament, placed in a receptacle, and topped with ſemibifid antheræ. The piſtillum is compoſed of an oblong germen with an awl-ſhaped ſtile, terminated with an acute ſtigma, which afterwards becomes a ſingle roundiſh naked ſeed.

HIRCUS, in anatomy, a part of the auricle or outer ear, being that eminence next the temples. See the article Ear.

Hircus, a goat, in aſtronomy, a ſtar of the firſt magnitude, the ſame with capella. See Capella.

HIRTELLA, in botany, a genus of plants whoſe flower conſiſts of five roundiſh concave petals, with a monophyllous cup divided into five parts: the fruit is an oval berry, a little compreſſed, broadeſt at top, and obtuſely trigonal, containing a large ſeed of the ſame figure.

HIRUDO, the leech, in zoology, a well known naked inſect, with a flatted but not jointed body, and broader at the end than elſewhere, and the ſkin ſoft and gloſſy.

HISPID Leaf, among botaniſts, one whoſe ſurface is covered with more thick and rigid hairs than the piloſe leaves are.

Hispid Stalk, among botaniſts, a ſtalk roughly hairy.

HISSING Letters, among grammarians, are S, X, and Z, ſo called on account of their harſh ſound.

HISTORICAL, ſomething that relates to hiſtory: thus we ſay, hiſtorical truth, hiſtorical ſtyle, hiſtorical narration of facts, &c. See the article History.

HISTORIOGRAPHER, a profeſſed hiſtorian, or writer of hiſtory.

HISTORY, an account, properly ſpeaking, of paſt tranſactions, narrated with ſuch important circumſtances as are proper to be tranſmitted to poſterity, and that in a regular continued ſeries.

Hiſtory is, of all others, the moſt difficult province. In other ſubjects there is a greater latitude for the writer's imagination; but, in hiſtory, he is confined to the occurrences he relates; and theſe, as they are not alike entertaining, require force and judgment in the narration to make them all agreeable. The richeſt fields of hiſtory are ſcenes of action and commotion, where nations are agitated by wars abroad, or factions at home. The moſt delicate part of an hiſtorian, which requires the deepeſt penetration, and ſoundeſt judgment, are the councils of ſtates and princes, the ſprings of action, the characters of men, the intereſt of parties, their different views, &c. Hiſtory will not admit thoſe decorations other ſubjects are capable of: the paſſions are not to be moved with any thing but the truth of the narration. All the force and beauty muſt lie in the order and expreſſion. To relate every event with perſpicuity, in ſuch words as beſt expreſs the nature of the ſubject, is the chief commendation of an hiſtorian's ſtyle. The colours facts are painted in, the ſtrength and ſignificancy of the ſeveral actions, the regular confuſion of a battle, the diſtractions of a tumult, ſo ſenſibly depicted, that in reading we ſeem to ſee them; this is the art and perfection of an hiſtorical ſtyle. An hiſtorian muſt not only write impartially, but nobly. He that ſpeaks to the whole world, and to all ages, that is the inſtructor of mankind, that pronounces the deſtiny of ſo many great men, and fixes their character with poſterity, what ſtrength of genius can be ſufficient for ſo important an enterprize? He muſt be capable of forming great and noble conceptions of things, and giving ſuch an exalted turn to his narration, as may truly comport with the dignity of his ſubject.

HISTORY, in painting, denotes a picture compoſed of divers figures, or perſons, repreſenting ſome tranſaction, either real or feigned. See PAINTING.

Natural HISTORY. See NATURAL.

HISTRIO, in the ancient drama, ſignified an actor or comedian, but more eſpecially a pantomime, who exhibited his part by geſtures and dancing.

HITCH, among ſailors, a certain knot or nooſe caſt upon a rope to faſten it to a poſt, ſhip, wharf, &c.

HITHE, or HYTHE, in old writers, denotes a port, wharf, or ſmall haven, to embark, or land wares at; as Queenhithe, &c.

HIVE, *Alveare*, in country affairs, a convenient receptacle for bees. See BEE.

HOACHE, in natural hiſtory, a kind of earth approaching to the nature of chalk, but harder, and feeling like ſoap; whence ſome think that it is either the ſame with our ſope-rock of Cornwall, or very like it. The Chineſe diſſolve it in water, till the liquor is of the conſiſtence of cream, and then varniſh their china-ware with it.

HOARSENESS, *Raucedo*, a preternatural roughneſs of the voice. The part affected is the aſpera arteria, particularly the larynx. This is a ſort of catarrhous indiſpoſition ariſing from a too great acrimony, thinneſs, or ſaltneſs of the lymph. Spermaceti, decoct. rapar. and rob. paſſular. are approved remedies in this diſorder.

HOASE, among ſailors, a piece of canvas ſewed together at the ſides, and made into the form of a tube, to convey water from one place to another; this is more particularly uſed in the hold or lower-apartments of the ſhip to fill the caſks which are already ſecurely ſtowed.

HOD, a well known inſtrument uſed by labourers to carry bricks, mortar, &c. in, at the building, or repairing of houſes, &c.

HOE, in country affairs, a tool made like a cooper's addz, to cut up weeds in gardens, fields, &c. This tool is commonly called the hand-hoe: for other ſorts of hoes ſee the next article.

This inſtrument is of great uſe, and ſhould be more employed in hacking and clearing the ſeveral corners, cracks, and patches of land, in ſpare times of the year, which would be of no ſmall advantage thereto.

HOEING, according to Tull, is the breaking or dividing the ſoil by tillage, while the corn, or other plants, are growing thereon. It differs from common tillage, which is always performed before the corn or plants are ſown or planted, or in the time of performing it: and it is much more beneficial to the crops than any other tillage. This ſort of tillage is performed various ways, and by means of different inſtruments. Land which, before the tillage, would have yielded little, though the more it is tilled before ſowing, the more plenty of corn it yields, yet, if tilled only before the ſowing, will always have ſome weeds, and they will partake of the advantage of the tillage as well as the corn. This is one reaſon for an after tillage, ſuch as that by hoeing. But there is another conſideration that yet more requires it; this is, that as ſoon as the ploughman has done his buſineſs, by ploughing and hoeing the land, after ſowing, the ſoil, of its own accord, begins to undo it all again, by tending towards its original texture and ſpecific gravity again; the altering of which was the only buſineſs of all the former tillage. The breaking the particles of the earth, and making in it new pores, and new particles, or new ſuperficies, is the great buſineſs of the plough and harrow; but, as ſoon as their uſe is over, the earth begins to coaleſce again into its former form, the particles unite together, and the artificial pores in a great meaſure cloſe up. The ſeed is nouriſhed in a worſe ground than it was firſt put into, and the more the plant grows up, and requires a larger ſupply of food, the worſe the paſture becomes. While nouriſhment is thus denied the growing plants, they are at the ſame time choaked with weeds, which, being of a hardier nature than they, will grow with leſs ſupplies, and therefore thrive more vigorouſly, and rob them of a great part of the little food the land before allowed them.

Farmers in all ages have been acquainted, in ſome degree, with the uſe of tillage and dung to crops of uſeful plants; but they have ſo ill managed the time of giving theſe aſſiſtances to nature, that there is no doubt but one third part of the nouriſhment raiſed by dung and tillage, if it were given to plants and corn at many proper ſeaſons, and proportioned to the different times of their exigencies, would be of more benefit to the crop than the whole is, when applied all together at the time of ſowing.

Nature, by what ſhe does in the animal œconomy, ſeems to point out to us ſomething like the remedying this by hoeing; for when the teeth, as the plough, have tilled that ſoil or maſs which is earth-altered; and when the ſaliva and the juices of the ſtomach have ſerved to divide and attenuate it, as the ſalts of dung and other manure do land; after all this, the bile and pancreatic juices are ordained to farther attenuate it, at the very time when it is ready to be exhauſted by the numerous mouths of the lacteals, ſituate in the inteſtines. This laſt operation of theſe juices ſeems analogous to the meliorating the ſoil by hoeing, after the plants are grown, and are becoming fit for uſe.

Tranſplanting is nearly allied in its nature to hoeing, but it is much inferior. The nature of this will not admit of its being a general thing; and even if it would, hoeing is better: for by tranſplanting, the plants can only be kept up to a certain period, after which they will not bear it; but hoeing may be uſed to them with advantage, to their utmoſt ſtanding, and make them vigorous all the while.

The roots of a plant are all neceſſarily broken off in tranſplanting, and it requires ſome time for it to ſtrike a whole ſet of new ones; and if the earth about it is not kept thoroughly moiſtened all this time, the new formed roots will not be able to ſhoot, and the plant will ſtarve in the midſt of plenty: but, on the contrary, in hoeing, the ſame advantage of a new paſture for the plant is obtained, by the breaking the particles of the earth, and at the ſame time no more of the roots are broken off than can eaſily be ſupplied, and the reſt remaining in their places, the plant continues growing without that ſtop or decay, which muſt happen on tranſplanting, and which it recovers only by degrees. It is obſerved, that ſome plants are the worſe for tranſplanting: lucerne and ſaintfoin are never ſo good after tranſplanting, as when they are left in their native places, at the ſame diſtances; and finochia, removed, is never ſo good and tender as when it is not. This laſt plant receives ſuch a check from tranſplanting in its infancy, that it has afterwards a diſeaſe like the rickets, which cauſes knots and ſwellings in it, that ſpoil it as a delicacy. All the tap-rooted plants ſuffer by tranſplanting; for it is neceſſary in this to cut off the long-main root, which afterwards, however good the ſoil may be, never arrives at the length it otherwiſe would have had, and which was neceſſary for the ſucceſs of the plant.

One great benefit of hoeing is, that it keeps plants moiſt in dry weather, the advantage of which to their growth is eaſily ſeen. This good office it performs on a double account. Firſt, as they are better nouriſhed by hoeing, they require leſs moiſture, and conſequently carry off leſs; for thoſe plants which receive the greateſt increaſe, having moſt terreſtrial nouriſhment, carry off the leaſt water, in proportion to their augment, as is proved by Woodward's experiments. Thus barley or oats, being ſown on a piece of ground well divided by tillage and dung, will come up and grow well without rains, when the ſame grains ſown on another part of the ſame land, not thus dunged or tilled, will ſcarce come up at all without rains, or if they do, will wait wholly for the rains for their growth and increaſe.

The hoe alſo, particularly the horſe-hoe, for the other does not go deep enough, procures moiſture for the roots from the dews which fall moſt in dry weather; and theſe dews ſeem to be the moſt enriching of all moiſture, as it contains in it a fine black earth, which will ſubſide from it in ſtanding, and which ſeems fine enough to be the proper pabulum, or food for plants.

A demonſtration that the tilled earth receives an advantage from theſe dews, which the untilled does not, is this; dig a hole in any piece of land, of ſuch a depth as the plough uſually goes to; fill this with powdered earth, and, after a day or two, examine the place, and the bottom part of this earth, and bottom of the hole, will be found moiſt, while all the reſt of the ground, at the ſame depth, is dry. Or, if a field be tilled in lands, and one land be made fine by frequent deep ploughings, while another is left rough by inſufficient tillage, and the whole field be then ploughed a-croſs in dry weather, which has continued long, every fine land will be turned up moiſt, and every rough land as dry as powder from top to bottom.

Although hard ground, when thoroughly ſoaked with rain, will continue wet longer than fine tilled land adjoining to it, yet, this water ſerves rather to chill than to nouriſh the plants ſtanding in it, and to keep out the other benefits of the atmoſphere; it leaves the ground much harder alſo than before, when it is finally exhaled out of it; and when, at length, the earth is then hardened, it can receive no benefit from any thing leſs than a deluge of rain, which ſeldom falls till the ſeaſon of vegetation is over.

As fine hoed ground is not ſo long ſoaked with rain, ſo the fine dews never ſuffer it to become perfectly dry. This appears from the flouriſhing ſtate of plants in hoed ground, while others near them, but in ground not hoed, are ſtarved for want of nouriſhment. The common opinion is againſt this, but obſervation proves it to be true againſt the common opinion. The vulgar are guided by this, however, and will not hoe their ground in dry weather for fear of letting in the drought, as they call it; whereas hoeing this is the only method of keeping away the drought, and without either this, or watering, they muſt periſh in theſe ſeaſons. *Tull's Horſe-Hoeing Huſbandry.*

HOG, *ſus*, in zoology, a genus of quadrupeds, of the order of the jumenta, the characters of which are theſe: the upper fore-teeth are four in number, and are convergent; thoſe of the lower-jaw are eight, and are patulous: the canine teeth of the upper jaw are two, and very ſhort; thoſe of the under jaw are ſingle, and exerted: the crown of the head is carinated, and the hoof is divided. See the article Swine.

Beſides the common hog, there are ſeveral other ſpecies, as, 1. the American hog, with the back briſtly behind, and with a naked tail: 2. the muſk-hog, with a cyſt, or gland on the back, in which is ſecreted a perfumed fluid; its tail is naked: 3. the babyrouſſa, with two teeth growing on the forehead.

HOGSHEAD, in commerce, a meaſure of capacity, containing ſixty-three gallons.

HOISING, in the ſea-language, the act of drawing up any weighty body by the help of a tackle or complication of pullies.

HOKE-Day, the Tueſday after Eaſter-week; which was the day on which the Engliſh conquered and expelled the Danes: this was, therefore, kept as a day of rejoicing, and a duty, called Hoke-Tueſday-Money, was paid to the landlord, for giving his tenants and bondmen leave to celebrate it.

HOLCUS, Indian millet, in botany, a genus of plants, whoſe flowers are male and hermaphrodite on the ſame plant: the corolla of the hermaphrodite flower is a bivalvular glume, with three capillary ſtamina and two ſtyles, and contains an oval ſeed involved in the corolla; the male flower is deſtitute of a corolla, the cup being a glume, containing three hairy filaments topped with oblong antheræ.

HOLD, in ſhip-building, all that part of a ſhip's inſide which reaches from end to end, from the lower deck to the floor or bottom; and contains the cargo, proviſions, &c.

HOLDFAST, a large piece of iron, in the ſhape of the letter S, fixed in a wall to ſtrengthen it: alſo a tool uſed by joiners, carvers, &c. which goes thro' their benches, to hold faſt ſuch work as cannot be finiſhed by its being held in the hand.

HOLIBUT, the name of a very large flat fiſh, reſembling the flounder, but longer in proportion to its breadth.

Holland, in commerce, a fine and cloſe kind of linen, ſo called from its firſt being manufactured in Holland. See the article Linen.

HOLLOW, in architecture, a concave moulding, about a quarter of a circle, called by ſome a caſement, and by others an abacus.

Hollow-Square, in the military art, a body of foot drawn up, with an empty ſpace in the middle for colours, drums, and baggage.

Hollow-Tower, according to Hanis, is a rounding made of the remainder of two briſures, to join the curtain to the orillon, where the ſmall ſhot are played, that they may not be ſo much expoſed to the view of the enemy.

HOLLY, *Ilex*, in botany, a well known evergreen, formerly very much planted in gardens as an ornament; it grows naturally in woods and foreſts in many parts of England, riſing to twenty or thirty feet in height; the ſtem by age becomes large, and is covered with a greyiſh bark; the leaves, which are armed with thorns, are placed alternately on every ſide of the branches: the flowers are of a dirty white, and appear in May; theſe are ſucceeded by roundiſh berries, which turn red in autumn, and continue on the trees till after Chriſtmas.

This tree is raiſed by ſowing the berries in the ſpring, but they will not come up till the year following. There are ſeveral varieties of variegated hollies, which are increaſed by grafting or inoculating them on the common ſort. The holly makes an excellent fence, and for that purpoſe is preferable to moſt other plants; but its being a ſlow grower at firſt, deters ſeveral from uſing it; but when it does take to growing, it makes amends by its height, ſtrength, and thickneſs.

From the bark of the common holly is made the bird-lime, and the wood is made into hones for ſetting razors; it is the whiteſt of all hard-woods, and therefore uſed by inlayers; it is alſo uſed by millwrights, turners, &c.

Knee-Holly, a name given to butchers-broom. See the article Ruscus.

Sea-Holly. See Eryngium.

HOLLYHOCK. See Alcea.

HOLOCAUST, a burnt-offering, or ſacrifice, wholly conſumed by fire; of this kind was the daily ſacrifice in the Jewiſh church. This was done by way of acknowledgement, that the perſon offering, and all that belonged to him, were the effects of the Divine bounty. The heathens, who alſo offered holocauſts, probably conſidered them in the ſame light: and the diſpoſing of ſacrifices this way was the general cuſtom, till Promotheus introduced the cuſtom of burning only a part, and retaining the remainder for his own table.

HOLOGRAPH, in the civil law, an inſtrument entirely in the hand-writing of the perſon who ſigns it.

HOLOMETER, a mathematical inſtrument for taking all ſorts of meaſures, both on the earth and in the heavens; it is the ſame with the pantometer.

HOLOSTEUM, in botany, a genus of plants, whoſe flower conſiſts of five bipartite, obtuſe, equal petals, with thee ſtamina: the fruit is an unilocular, ovate capſule, containing a number of roundiſh ſeeds.

HOLY-Ghost, one of the perſons of the holy Trinity.

Order of the Holy-Ghost, the principal military order in France, inſtituted by Henry III. in 1569. It conſiſts of an hundred knights, who are to make proof of their nobility for three deſcents. The king is the grand maſter, or ſovereign, and as ſuch, takes an oath on his coronation-day, to maintain the dignity of the order.

Holy-Thursday, the ſame with aſcenſion-day. See Ascension.

Holy-Days, the ſame with feſtivals. See the article Festival.

Holy-Rood-Day, a feſtival otherwiſe called the exaltation of the croſs.

Holy-Thistle, in botany. See the articles Cnicus and Carduus-Benedictus.

HOMAGE, in law, is the ſubmiſſion, loyalty, and ſervice which a tenant promiſed to his lord, when he was firſt admitted to the land which he held of the lord in fee: alſo that owing to a king, or to any ſuperior.

Homage-Jury, a jury in a court baron, conſiſting of tenants that do homage to the lord of the fee.

This jury makes enquiry into, and preſentments of, defaults and deaths of tenants, and of admittances and ſurrenders into the lord's court.

HOMESOKEN, a privilege enjoyed by every perſon in his own houſe or home, which ought not to be invaded.

HOMICIDE, in common law, the killing a man. It is divided into voluntary and caſual. Caſual is either merely caſual, or mixed; the former is when a perſon kills another by pure miſchance, being about his lawful occaſions: it is accounted mixed, when there is negligence or ſome unwarrantable circumſtance attending the action. Voluntary homicide, that which is deliberate; and is either with a precedent malice, or without: the former is a felonious killing, with malice prepenſe, any perſon in the realm, who is under his majeſty's protection.

HOMILY, in eccleſiaſtical writers, a ſermon, or diſcourſe, upon ſome point of religion, delivered in a plain manner, ſo as to be eaſily underſtood by the common people.

HOMODROMUS Vectis, that kind of lever, in which the weight is in the middle, between the power and the fulcrum, or the power in the middle between the weight and the fulcrum. See Lever.

HOMOGENEUS, or Homogeneal, denotes ſuch ſubjects as conſiſt of parts of the ſame nature, in contradiſtinction to heterogeneous, where the parts are of different natures.

HOMOGENEAL Light, that whoſe rays are all of the ſame colour, degree of refrangibility, and reflexibility. See Colour.

Homogeneal Numbers, ſuch as are of the ſame kind.

Homogeneal Surds, ſuch as have one common radical ſign, as $\sqrt{}^2 a$ $\sqrt{}^2 b$, or $\sqrt{}^3 b^3$. See the article Surds.

HOMOGENEUM Comparationis, in algebra, the known quantity in an equation, the ſame with abſolute number. It is ſo called to diſtinguiſh it from the other terms, which, though homogeneous, are not the quantities to which things are here referred.

HOMOLOGOUS, in geometry, is applied to the correſpondent ſides and angles of ſimilar and equiangular figures, which are ſaid to be homologous, or in proportion to one another.

Homologous Things, in logic, thoſe which agree in name, but are of different natures.

HOMONYMOUS, an appellation given to words which have two different ſignifications, being the ſame with equivocal terms.

HONE, a fine kind of whetſtone, uſed for ſetting razors, pen-knives, and the like.

HONEY, *Mel*, a ſweet vegetable juice, collected by the bee from the flowers of different plants, and depoſited in the cells of the combs; from which it is extracted, either by ſpontaneous percolation through a ſieve in a warm place, or by expreſſion. That which runs ſpontaneouſly is purer than the expreſſed; a quantity of the waxy and other impurities being forced out along with it by the preſſure, eſpecially when the combs are previouſly heated. The beſt ſort of honey is of a thick conſiſtence, a whitiſh colour, an agreeable ſmell, and very pleaſant taſte: both the colour and flavour are ſaid to differ in ſome degree according to the plants which the bees collect it from.

Honey expoſed to a gentle heat, as that of a warm bath, becomes thin, and throws up to the ſurface its waxy impurities, together with the meal or flower, ſometimes fraudulently mingled with it, which may thus be ſeparated by diſpumation, ſo as to leave the honey pure. On continuing the heat, there riſes a conſiderable quantity of aqueous fluid, impregned with the fine ſmell of the honey: the inſpiſſated reſiduum, like the honey at firſt, diſſolves both in water and in rectified ſpirit, and promotes the union of oily and reſinous ſubſtances with watery liquors. By treating the inſpiſſated maſs with moiſt clay, as practiſed by the ſugar-bakers for purifying ſugar from its unctuous treacly matter, the unctuous parts of honey may in like manner be ſeparated, and its pure ſweet matter obtained in the form of a ſolid, ſaline, white concrete.

This juice is an uſeful ſweet, for medicinal as well as for domeſtic purpoſes; more aperient and detergent than the ſimpler ſweet prepared from the ſugar cane; particular ſervicable for promoting expectoration in diſorders of the breaſt, and as an ingredient in cooling and detergent gargariſms. For theſe, and other ſimilar intentions, it is ſometimes mixed with vinegar, in the proportion of about two pounds to a pint, and the mixture boiled down to the conſiſtence of a ſyrup; ſometimes impregnated with the virtues of different vegetables, by boiling in like manner with their juices or infuſions, till the watery parts of the juice or infuſion have exhaled and left the active matter incorporated with the honey. The boiling of honey, though it diſſipates great part of its odorous matter, and thus proves in ſome caſes injurious to it, is in ſome caſes alſo of advantage: there are particular conſtitutions, with which honey remarkably diſagrees, and in which even very ſmall quantities occaſion gripes, purging, and great diſorder: by boiling, it loſes of that quality by which it produces theſe effects.

Honey-Comb, a waxen ſtructure full of cells, framed by the bees to depoſit their honey, eggs, &c.

There is ſomething very wonderful in the conſtruction of the cells in the honey-comb. Each cell conſiſts of ſix plane ſides, which are all trapeziums, but equal to each other. The bottom of the cell is contrived with three rhombus's, HKDI, DEFI, and FIGH (pl. LX. *fig.* 3.) ſo diſpoſed as to conſtitute a ſolid angle at I, under the three equal angles DIH, DIF, and HIF; each of which is double the maximum angle of $54° 44' = DIK = DKI$. Hence it comes to paſs, that a leſs quantity of ſurface is ſufficient to contain a given quantity of honey, than if the bottom had been flat, in the proportion of 4658 to 5550, as has been found by calculation; that is, nearly $\frac{1}{5}$ of the whole, ſo far as the figure of the ends of the cells extend in each, which fifth part of wax and labour ſaved, amounts to a vaſt deal in the whole comb. And if theſe admirable inſects knew their advantage, they could not more nicely obſerve the rules of the modern geometry. Hence we may obſerve, that though the method of diſcovering the maxima and minima of quantities by fluxions is a part of knowledge which the mathematicians have but lately acquired, and which they eſteem the ſublimity of human ſcience, yet this very thing was imparted to theſe inſects at the firſt creation of things.

The celerity with which a ſwarm of bees received into a hive, where they find themſelves lodged to their minds, bring their works of the combs to perfection, is amazing. There are vaſt numbers at work all at once; and that they may not incommode one another, they do not work upon the firſt comb till it is finiſhed, but when the foundation of that is laid, they go to work upon another, ſo that there are often the beginnings of three or four ſtories made at once, and ſo many ſwarms allotted to the carrying on the work of each.

Honey-Comb, in gunnery, a flaw in the metal of a piece of ordnance, when it is ill caſt and ſpongeous.

HONOUR-POINT, in heraldry, is that next above the center of the eſcutcheon, dividing the upper part into two equal portions. See the article Point.

HONEYSUCKLE. See Lonicera.

French Honeysuckle. See Hedysarum.

HONEYWORT. See Cerinthe.

HOOD, in falconry, a piece of leather, with which the head of a hawk, falcon, &c. is covered.

HOOF, *Ungula*, the horny ſubſtance that covers the feet of divers animals, as oxen, horſes, ſheep, &c.

A horſe's hoof ſhould be of a round, not longiſh figure; and its ſubſtance ſolid, tough, high, ſmooth, without any circles, ſomewhat ſhining, and of a dark colour; for that which is white is commonly brittle; in ſhort, it ought to be of the colour of the hoof of a deer, and the whole foot round, but a little larger below than above; upright, and ſomewhat hollow on the inſide, and ſo diſpoſed that he may tread more on the toe than the heel.

The hoof of a horſe is either perfect or imperfect: an imperfect hoof is one that wants any of the above qualities; and, 1. May be broad and ſpreading out at the ſides and quarters; ſuch a horſe has, for the moſt part narrow heels, and will ſoon be flat-hoofed; he will neither carry a ſhoe long, nor travel far. 2. Others are rugged or brittle-hoofed, which is a ſign that it is too hot and dry. 3. Some are long, which cauſes the horſe to tread all upon his heels, and by that means to breed wind-galls. 4. There are ſome crooked hoofs, broad on the outſides and narrow within, by which means the horſe is ſplay-footed. 5. Others have flat hoofs, and not hollow within, which give riſe to the inconveniencies above ſpecified in the firſt ſort of imperfect hoofs; but if it be too hollow, it will dry too faſt, and make him hoof bound. 6. When the fruſh is broad, the heels will be weak and ſoft, and the horſe will never tread boldly on the ground. 7. Some have narrow heels; theſe are the tendereſt of all, and the horſe will grow hoof-bound.

Bony Hoof is the round bony ſwelling, growing on the very top of a horſe's hoof, which is always cauſed by ſome blow or bruiſe.

The method of cure is, firſt to digeſt the ſwelling, either with rotten litter, or hay boiled in ſtale urine, or with a plaſter of ſtale wine lees and wheat flower boiled together, in order to ripen it, and bring it to ſuppuration, or to diſſolve the tumor. If it come to a head, lance it in the loweſt part of the ſoftneſs, with a thin hot iron, to let out the matter; then tent it with turpentine, deer's ſuet, and wax, equal quantities of which ſhould be boiled together; and laying a plaſter of the ſame ſalve over it, to keep in the tent till it be thoroughly well.

Hoof-Bound, this diſorder is a ſhrinking of the hoof at the top and at the heel, which makes the ſkin ſtare above the hoof, and grow over it.

This diſorder may happen to a horſe, either by keeping him too dry in the ſtable, by ſtreight ſhoeing, or by ſome unnatural heat after foundering.

Hoof-Brittle, an infirmity in horſes, proceeding either naturally, from the ſire or dam; or accidentally, from a ſurfeit falling down into the feet; or from the horſe's being formerly foundered.

For the cure, take unwrought wax, turpentine, ſheep's ſuit, and hog's greaſe, of each four ounces; ſallad oil, a quarter of a pint; and of dog's greaſe, half a pound: boil them all together, and with this mixture, anoint the hoof well for two or three days, eſpecially at the ſetting on of the hair, and ſtop them with cow-dung and dog's greaſe, melted together.

Hoof-Swelled, a diſorder that ſometimes happens by a prick, or a young horſe's being over-ridden, or too hard wrought, and which, if not ſpeedily removed, will beget a wet ſpaven.

For the cure, take the ſtrongeſt aqua-fortis you can get, and firſt file or draw away the old hoof ſomewhat near, with a file or drawing-iron; then touch what is left of the hoof, three or four dreſſings or more, with the aqua-fortis; and anoint the foot with an ointment made of one pound of hog's greaſe; patch-greaſe, three quarters of a pound; Venice-turpentine, five ounces; new wax, three ounces; and ſallad oil three ounces; all melted together over the fire; and by anointing the coffin of the foot quite up to the top, you will cauſe a new hoof to grow upon it.

HOOK-Pins are bolts made with a ſhoulder at one end, and uſed by carpenters in framing: theſe are drove through the mortices and tenants of the work, prepared for building or wharfing.

HOP, *Lupulus*, or *humulus*, in botany, a plant of the dioecia pentandria claſs; neither the male nor female flower of which has any corolla; the cup of the male flower is compoſed of five leaves, that of the female is an acute quadrifid involucrum, large and of an oval figure; the ſeed is ſingle, roundiſh, covered with a coat, and contained in the baſe of the cup.—It hath a creeping root, with ſuch weak ſtalks that they could not ſupport themſelves without twiſting about whatever is near them; they are exceeding long, rough, angular, hairy, and hollow, and the leaves proceed from the ſtalks by pairs, and are placed oppoſite; they are generally divided into three, and ſometimes into five ſegments, and are ſerrated on their edges; the leaves are not in uſe, but the flowers is a well-known ingredient in beer and other malt liquors.

For the cultivation of hops, a rich, deep, mellow, dry ſoil, more inclining to ſand than clay, is in general the beſt; and in particular, a black garden mould is excellent. Stiff clays, ſpewy lands, ſuch as are apt to be overflown by floods, hard gravels, ſtony grounds, very ſandy ones, and ſuch as are not at leaſt a foot and an half deep, are altogether improper for hops.

The beſt ſituation for hop-grounds is ſuch as inclines to the ſouth, or lies open to it, ſo that they may have the benefit of the ſun during the greateſt part of the day. It muſt alſo be open, for the air to have a free paſſage and circulation between the plants; and it ſhould be ſo ſheltered to the eaſt, north, and weſt, that neither the froſty winds in the ſpring muy cut off the young ſprouts, nor the more ſtormy ones in ſummer and autumn deſtroy the full-grown hops.

The ground and ſituation being choſen, the next buſineſs is to prepare it for the planting. In many parts of England, when the ground is broken up for this purpoſe, the plough goes firſt, and men follow it with the ſpades, with which they dig one ſpit deep in the furrows where the plough has paſſed, throw up the earth thus dug, and ſo continue to plough and dig till the whole is done. Either this tillage, if it be well performed, or the deep ploughings, croſs-ploughings, and harrowings, by which careful huſbandmen prepare their land for corn, will fit this for being ſown with turnip-feed, in the end of July, or beginning of Auguſt, and if the turnips are hoed twice, ſo as to be left about eight inches aſunder, they will yield a good crop, the weeds will be deſtroyed, and the ground will be rendered looſe and fine. Another good ploughing after the turnips are taken off, will, with the enſuing winter mellowing, render it fit for being planted with hops in the ſpring.

The beſt time to begin the ploughing is in October, in order that the ſoil may be properly prepared to receive the benefits of the winter's froſts, rains, and ſnows; after which, in the beginning of ſpring, it ſhould be well and deeply ploughed again, and well harrowed; and after another ploughing in March, which will be of very great ſervice, it ſhould be harrowed fine, and laid as even as can be.

When the ground is in proper readineſs for planting, ſtretch along a ſtrait ſide of the field, at fifteen or twenty feet diſtance from the hedge, and parellel to it, a line with knots or rags tied in it, as far aſunder as you deſign your hills to be, and ſtick in the ground a ſharp pointed ſtick at every knot, as marks for the places where the hills are to be made: continue the line in this manner the whole length of the ground, and from this firſt row you may mark out the reſt of the field, either in ſquares, chequerwiſe, at the intended diſtance of the hills, or in the quincunx form, where the hills of every row lie oppoſite to the middle of the firſt, in a triangular form.

The diſtance of the hills ſhould be, in ſome meaſure, regulated by the nature and goodneſs of the ſoil: but, in every caſe, they ſhould be far enough aſunder to admit the hoe-plough at all times without danger to the plants. If the ſoil be dry and ſhallow, ſix or ſeven feet will be a convenient diſtance: but if it be rich, moiſt, and apt to bear large hops and leaves, it may be right to allow eight or nine feet between the hills.

The moſt proper ſeaſon for planting hops is from the beginning of March to near the middle of April, at the time when they begin to ſhoot. The Kentiſh huſbandmen approve likewiſe of october: but the common ſorts are not to be procured then, unleſs it be from a ground that is to be dug up and deſtroyed: beſides which, there is ſome danger in their rotting in the earth, if the winter ſhould prove very wet.

There are ſeveral ſorts, though the botaniſts allow but one ſpecies, of hops. The moſt eſteemed are, the long white, the oval, and the long ſquare garlic hop. Theſe differ from each other in the colour and ſhape of their bells, or hops, in their degree of bearing, and in their time of ripening. The long white is moſt valued, becauſe it is a great bearer, and produces the moſt beautiful hops; for the beauty of hops conſiſts of their being of a pale bright green colour. The oval hop is beautiful, but does not yield ſo large a crop. There is a ſort of this kind of white hop, called the early, or rath hop, which ripens a week or ten days before the common, and is therefore of advantage to thoſe who would be firſt at market: but it is tenderer than the other, and does not bear near ſo plentifully. The long ſquare garlic hop is the greateſt bearer, more hardy, and ſomewhat later ripe than the former; but by reaſon of its redneſs towards the ſtalk, it is not ſo beautiful to the eye, and therefore is not ſo much eſteemed as the other ſorts.

Few hop grounds are without ſome plants of a ſort of hop which many call the female hop, but very erroneouſly; for the female hop is that which is cultivated for uſe, and this, which others name more properly the wild hop, is the male. Towards the middle of July, it puts out a great number of long looſe bunches of ſmall flowers, not at all like the true hop; and in ſomewhat leſs than a month after, that is to ſay, juſt before the true hop begins to bloſſom, they ripen, and with the leaſt motion of the wind, ſhed a farina, which is wafted all around, and is by ſome, not improbably, thought to be of uſe to impregnate other hops. Thoſe who are of this opinion adviſe therefore to leave one or two hills of them ſtanding in the hop-ground. But the common practice is to mark them at their firſt appearance, and to root them out afterwards, becauſe they do not bear bells or hops, and as they are generally the ſtrongeſt plants, ſets might otherwiſe be taken from them by miſtake.

There is alſo a poor ſtarved hop, called a wild hop, which is not judged to be a diſtinct ſort, but a hop which has degenerated for want of culture.

The planter of hops ought to be extremely careful in the choice of his plants, or ſets, particularly in regard to the kind of the hop: for it is a great trouble and loſs to him when his garden proves to be a mixture of ſeveral ſorts of hops, ripening at different times. He who plants the three ſorts abovementioned, viz. the early, the long white, and the ſquare hop, in three diſtinct parts of his ground, will have the conveniency of picking them ſucceſſively as they become ripe.

Hop-ſets are cuttings from the roots or branches which grow from the main root or ſtock. They ſhould be procured, if poſſible, from grounds planted with none but the ſort which is deſired; and they ſhould be from five to ſeven or eight inches long, with three or more joints or buds on them, all the old bind and hollow part of the ſet being cut off.

The ground being prepared for planting, as before directed, towards the latter end of February, or in the beginning of March, if the ſoil be light, or late in March if it be ſtrong and moiſt, make, in the places marked out by the ſticks ſtuck in them, holes about twelve or ſixteen inches wide, and of a depth proportioned to the nature of the ground. In general, ten or twelve inches will be a ſufficient depth. If the ground be ſhallow, and you meet with hard clay or gravel, by no means enter into this, for you would then make a baſon to retain water; but, in ſuch caſe, inſtead of going deeper, raiſe up a ſmall hill of good mould. If there is a good depth of rich mellow mould, dig the hole a foot and a half or two feet deep, and you will find the hops thrive the better; for their tap roots naturally run downward.

When all things are ready for planting, fill up the holes with the mould before thrown out of them, if it be naturally good, after having firſt broke it fine with a ſpade: but if the ſame earth be not rich enough, make uſe of fine freſh mould, or of the compoſt provided for this purpoſe. About a peck or two of this will be ſufficient for each hill; but no new dung ſhould be put into the hole on any account.

Then, with a dibble or ſetting ſtick, ſuch as gardeners generally uſe for planting of beans, make five or ſix holes, the depth of your ſets, one in the middle, perpendicular, and the reſt round about, ſloping, and meeting at the top near the center: put your ſets therein, ſo that they may ſtand even with the ſurface of the ground; and then preſs the mould cloſe to them, and cover them with fine mould two or three inches thick. A ſtick ſhould be placed on each ſide of the hill to ſecure it.

The ground being thus planted, all that is to be done in the following ſummer, is to keep the hills and alleys clear from weeds by frequent hoeings; to dig the ground in the month of May, and to carry off all the ſtones that are turned up by digging; to raiſe a ſmall hill about the plants; to throw ſome fine mould on their roots; and in the latter end of May, or beginning of June, to twiſt all the vines and branches together into a bunch or looſe knot, and lay them thus twiſted on the top of the hill.

Towards the latter end of February, or in the beginning of March, in the ſecond year, when the weather is kindly, open the hills, and with a ſharp knife cut off the ſhoots of the firſt year to within an inch of the old ſtock, together with all the younger ſuckers that have ſprung from the ſets, and cover the ſtock with fine earth. To keep the knife ſharp, you ſhould have a whetſtone always by you at dreſſing.

In the third and following years, when you dig your hop-ground in February, let the earth be taken away with a ſpade, or hoe, round about the hill, very near them, that you may the more conveniently come at the ſtock to cut it: then in fair weather, towards the beginning of March, if your hops be weak, begin to dreſs them; but if they are ſtrong, and in heart, the middle or latter end of March will be the beſt time; for late dreſſing reſtrains their too early ſpringing, which is the cauſe of many injuries to the hop.

After the hops are dreſſed in the ſecond year, the next buſineſs is to pole them. Poles of only ten or twelve feet long will do then; but in the third year, by which time they come to their full bearing ſtate, they will require poles of full ſize: this, if the ground be rich, and the hop vigorous, will be from ſixteen to twenty feet, or even more; or there will be danger of loſing great part of the crop.

If the hop be weak, and the ground not rich, the poles ſhould not be more than fourteen or eighteen feet long, for fear of impoveriſhing the root; for the hop will ſoon run itſelf out of heart if over poled; ſo that, as was ſaid before, there is more danger in over-poling than in under-poling: neither can a good crop be expected from an over-poled ground, becauſe the branches which bear the hops grow very little till the buds have over-reached the poles, which they cannot do when the pole is too long. Two ſmall poles are ſufficient for a hill in a young ground.

Towards the latter end of July, hops begin to bloſſom, about the beginning of Auguſt they bell, and in forward years, they are ſometimes ripe at the end of Auguſt, or beginning of September. When they begin to change colour, or are eaſily pulled to pieces, when they emit a fragrant ſmell, and when their ſeeds begin to look brown and to grow hard, you may conclude that they are ripe: then pick them with all expedition; for a ſtorm of wind will do them great miſchief at this time; and hops picked green and bright, without bruiſing or diſcolouring, will ſell for a third part more than thoſe that are otherwiſe.

When the poles are drawn up in order to be picked, the vines around them ſhould be cut aſunder at the height of about three or four feet from the ground; for the cutting of them lower, eſpecially while the hops are green, would occaſion ſo great a flowing of the ſap, as would weaken and hurt the root.

The moſt convenient way of picking them is into a long ſquare frame of wood, called a bin. This frame is made of two poles, or pieces of wood, each nine or ten feet long, and three or four inches broad, joined together at about a foot and a half from each end, by two other pieces three feet long; and it is ſupported by four legs three feet and a half high; ſo that there remain in the middle of it a ſpace ſix feet long, three wide, and three and a half deep. In this ſpace is fixed a coarſe linen cloth, or hop-bag, cut open on one ſide, and hung hollow, either by hitching it on tenter-hooks along the ſide of the frame, or by ſtretching it on the outſide with wooden ſkewers, to receive the hops as they are picked. Three men or women, or four boys or girls, may ſtand at each ſide of the frame, and pick two poles at a time.

The hops ſhould be picked as free as poſſible from leaves and ſtalks; for theſe would be of greater prejudice to the ſale, than any ſeeming advantage which might be expected from their weight. The bin ſhould be emptied two or three times a day, into a large cloth of coarſe linen, in which the hops ſhould be immediately ſtitched up with ſkewers, and carried directly to the oaſt, or kiln, to be dried; for if they remain long in the bin, or cloth, they will ſweat and be diſcoloured; but if you cannot dry them immediately, and muſt keep them a little while, ſpread them on a floor, and by that means the damage which they will receive in a day or two will not be great.

In drying of hops, firſt lay the hair-cloth very even on the bed or floor of the kiln, and ſpread the green hops thereon, about ſix inches thick, laying them with a rake as ſmooth as poſſible, not thicker in one place than another. Let the kiln be moderately warmed before you lay on the hops; then keep an even.

even and ſteady fire under them, but not too fierce at firſt, for fear of ſcorching them; and let not the fire ſlacken, but rather increaſe it, till the hops are nearly dried, leſt the moiſture or ſweat, which the fire has raiſed, fall back and diſcolour the hops. After the hops have lain thus about ſeven, eight, or nine hours, have left off ſweating, and leap up when beaten with a ſtick, then turn them upſide down with a broad malt ſhovel, or ſcoop made for that purpoſe, or caſt them up into a heap in the middle, and afterwards ſpread them equally on all ſides. Let them remain in this ſituation for two or three hours more, till every hop, if poſſible, be thoroughly and equally dried; and then with a hair-cloth, remove them to the heap where they are to lie till they are bagged.

Hops break all to a powder if they are bagged hot from the kiln. To prevent this, they ſhould be laid in a heap, to ſweat and grow tough; and if they are then covered for a while cloſe with blankets, to keep the air from them, they will bag the better. There is no limited time for their ſweating; that varying according to the weather, three or four days are commonly ſufficient; but it is a certain rule, that when the hops feel moiſt and clammy, and can be ſqueezed in the hand, or trodden cloſe, without breaking, they are then fit for bagging. The harder they are trodden, the better they will keep.

The bags proper for this occaſion are made of coarſe linen cloth. They are commonly about eleven feet long, and near two yards and a half in circumference, and contain about two hundred and a half weight of hops. The ſmall bags, called pockets, contain about half that weight.

The manner of bagging is thus: make a round or a ſquare hole, but a round one is moſt convenient, about twenty-ſix or thirty inches over, in the floor of the chamber where the hops are laid in heaps after they are ſweated. This hole ſhould be large enough to receive the bag, and for a man to go up and down it with eaſe. Tie with a piece of packthread a handful of hops in each lower corner of the bag, to ſerve as handles for the more eaſy lifting or removing of the bag; and, with packthread, faſten the mouth of the bag to a frame, or hoop, ſomewhat larger than the mouth of the hole, that the hoop may reſt on its edges, and ſtrong enough to bear the weight of the hops when the bag is full, and of the man who treads them. The upper part of the bag being thus fixed by the hoop, let the reſt of it hang down through the hole; but not ſo near to the lower floor as to touch the ground: then throw into it a buſhel or two of hops; and let a man go into the bag, and with ſhoes that have no heels, tread the hops down on every ſide, as hard as he can, till they lie cloſe. Let more hops be then caſt into the bag, and be trodden down, as before; and continue this till the bag is full. When that is done, untie it from the hoop, let it down, and ſew up its mouth as cloſe as you can, obſerving at the ſame time to tie up ſome hops in the upper corners, as was done before in the lower.—The harder the hops are preſſed, and the cloſer and thicker the bag is, the longer and better the hops will keep.

HOPPER, a kind of baſket wherein the ſeed-corn is carried at the time of ſowing. See the article SOWING.

It is alſo uſed for the wooden trough in a mill, into which the corn is put to be ground. See the article MILL.

HORARY, ſomething relating to an hour: hence

HORARY, or HOUR-CIRCLE *of a Globe*, is a ſmall brazen circle, fixed upon the brazen meridian, divided into twenty-four hours, having an index moveable round the axis of the globe, which upon turning the globe fifteen degrees, will ſhew what places have the ſun an hour before or after us. See GLOBE.

HORARY CIRCLES, or LINES, in dialling, are the lines or circles which mark the hours on the ſun-dials. See DIAL.

HORARY MOTION *of the Earth*, the arch it deſcribes in the ſpace of an hour, which is nearly fifteen degrees, though not accurately ſo, as the earth moves with different velocities, according to its greater or leſſer diſtance from the ſun. See EARTH.

HORD, in geoprahy, is uſed for a company of wandering people, who have no ſettled habitation, but ſtroll about, dwelling in waggons, or under tents, to be ready to ſhift as ſoon as the herbage, fruit, and the preſent province is eaten bare: ſuch are ſeveral tribes of the Tartars, particularly thoſe who inhabit beyond the Wolga, in the kingdom of Aſtracan and Bulgaria.

A hord conſiſts of fifty or ſixty tents, ranged in a circle, leaving an open place in the middle. The inhabitants of each hord uſually form a military company or troop, the eldeſt of which is commonly the captain, and depends on the general or prince of the whole nation.

HORDEOLUM, *Crithe*, or *Barley-Corn*, ſo called from its reſemblance to that grain, in medicine, a tumour that grows in different parts of the eye-lids; it is commonly called a ſtye. When it is ſmall, it comes only on the edge of the eye-lids, or very near it between the cilia; but when it is larger, it ſpreads towards the middle of the lid. In their beginning, an inflammation commonly accompanies theſe tumors: when they do not ſuppurate, their matter is concreted, and they become wens, which are ſometimes ſoft and ſometimes very hard. Sometimes this diſeaſe diſappears a while, and afterwards returns in a few days.

The cure of this diſeaſe is ſuited to the different circumſtances that attend it. If there be an inflammation, the pulp of a roaſted apple applied by way of poultice, ſoon diſperſes it, and ſometimes only abates the tumor. If it hardens, it muſt be opened with a lancet, and the hard fleſh conſumed by a liquid cauſtic, and afterwards the plaſter of the abbot de Grace applied.

If the hordeolum comes on the lower eye-lid, it is generally more on the inſide than the outſide, and is cured by the lapis infernalis, or rather by making an inciſion therein, drawing out the tumor and applying a collyrium of ten parts of water to one part of ſpirit of wine.

There are other little tumors on the edges of the eye-lids, which by reaſon of their whiteneſs and hardneſs are called chalazæ; as alſo another ſort, called lithiaſis or gravel-ſtone. All which are cured in the ſame manner.

HORDEUM, barley. See BARLEY.

HOREHOUND, *Marubium*, in botany. See MARUBIUM.

HORIZON, in aſtronomy, a great circle of the ſphere, dividing the world into two hemiſpheres, the one upper and viſible the other lower and inviſible.

The horizon is either rational or ſenſible.

Rational, *True*, or *Aſtronomical* HORIZON, called generally the horizon, is a great circle, whoſe plane paſſes through the center of the earth, having the zenith and nadir for the poles thereof. It divides the ſphere into two equal parts, or hemiſpheres.

The meridian and vertical circles all cut the rational horizon at right angles, and into two equal parts.

Senſible, *Viſible*, or *Apparent* HORIZON, is a leſſer circle of the ſphere: this circle divides the viſible part of the ſphere from the inviſible, and has for its poles the zenith and nadir; conſequently the ſenſible horizon is parallel to the rational; and it is cut at right angles, and into two equal parts, by the verticals.

HORIZON, in geography, is a circle paſſing over the earth, and dividing the viſible part of the earth and heavens from that which is inviſible.

The altitude or elevation of any point of the ſphere, is an arch of a vertical circle, intercepted between it and the ſenſible horizon.

This is peculiarly denominated the ſenſible horizon, to diſtinguiſh it from the rational, or true, which paſſes through the center of the earth, as already obſerved.

F. Lavel, profeſſor of hydrography at Marſeilles, found that the arch of the circumference of the earth intercepted between the obſervatory to the ſeaward and the horizon, fluctuated between fifteen minutes and thirteen minutes and a half: whence M. Caſſini deduces that the extent of the horizon is ſeven French leagues, of three miles each; and that the obſervatory is 175 feet hight.

HORIZONTAL, ſomething relating to the horizon; or that is taken in, or on a level with the horizon: thus we ſay, an horizontal plane, &c.

HORIZONTAL DIAL, that drawn on a plane parallel to the horizon, having its ſtyle elevated according to the altitude of the pole, in the place it is deſigned for. See the article DIAL.

HORIZONTAL DISTANCE. See the article DISTANCE.

HORIZONTAL LINE, in perſpective, a right-line drawn through the principal point parallel to the horizon; or it is the interſection of the horizontal and perſpective planes. See the article PERSPECTIVE.

HORIZONTAL PARALLAX. See PARALLAX.

HORIZONTAL PLANE, that which is parallel to the horizon of the place, or nothing inclined thereto.

The buſineſs of levelling is to find whether two points be in the horizontal plane, or how much the deviation is.

HORIZONTAL PLANE, in perſpective, a plane parallel to the horizon paſſing through the eye, and cutting the perſpective plane at right angles.

HORIZONTAL PROJECTION. See the articles PROJECTION and MAP.

HORIZONTAL RANGE, or *Level Range*, of a piece of ordnance, is the line it deſcribes when directed parallel to the horizon.

Dr. Halley has given us the two following uſeful theorems:

1. A ſhot being made on an inclined plane, having the horizontal diſtance of the object it ſtrikes, with the elevation of the piece, and the angle at the gun between the object and the perpendicular, to find the greateſt horizontal range of that piece loaded with the ſame charge of powder, that is, half the latus rectum of all the parabolas made with the ſame impetus.—Take half the angle contained between the object and nadir, and the difference of the given angle of elevation from that half; ſubtract the verſed ſine of that difference from the verſed ſide of the angle made by the object and zenith: the difference of thoſe verſed ſines will be to the ſine of the angle laſt mentioned, as the horizontal diſtance of the object ſtruck to the greateſt range at forty-five degrees.

2. Having the greateſt horizontal range of a gun, the horizontal diſtance and angle of inclination of an object to the perpendicular, to find the two elevations neceſſary to ſtrike that object.—Take half the angle contained between the object and nadir, this half is equal to half the ſum of the two angles of elevation ſought; then ſay, as the horizontal range is to the horizontal diſtance of the object, ſo is the ſine of the angle of inclination to a fourth proportional; which fourth, being ſubtracted from the verſed ſine of the angle formed by the object and zenith, leaves the verſed ſine of half the difference of the angles of elevation, whoſe half ſum was before

obtained; therefore, by adding and ſubtracting half the difference of the angles of elevation to and from the ſaid half ſum, the elevations themſelves will be found. See the article PROJECTILE.

HORIZONTAL REFRACTION. See the article REFRACTION.

HORMINUM, clary, in botany. See CLARY.

HORN, *Cornu*, in phiſiology, a hard ſubſtance growing on the heads of divers animals, particularly the cloven-footed quadrupeds; and ſerving them both as weapons of offence and defence.

HORN is alſo a muſical inſtrument of the wind kind, chiefly uſed in hunting, to animate the hunters and the dogs, and to call the latter together.

The French-horn is bent into a circle, and goes two or three times round, growing gradually bigger and wider towards the end, which in ſome horns is nine or ten inches over.

HORN, in architecture, ſometimes denotes a volute. See VOLUTE.

HORNS *of Inſects*, the ſlender oblong bodies projected from the heads of thoſe animals, and otherwiſe called antennæ, or feelers.

HORNBEAM, *Carpinus*, in botany, a genus of plants producing male and female flowers, which are apetalous; the male flowers are arranged into a cylindrical amentum, and the female are diſpoſed in the ſame form; there is no pericarpium, but the amentum growing very large, contains, at the baſe of each ſquamula, an oval angulated nut.

The common hornbeam grows in many parts of England, and will thrive upon the moſt cold, barren, and expoſed hill, where few others will grow. It is beſt raiſed from ſeeds, which ſhould be ſown in autumn ſoon after they are ripe, and afterwards treated as other foreſt trees. The leaves of this ſort remain on the tree till ſpring, ſo that they afford much ſhelter for the birds in winter; and this renders them very proper to be planted round the borders of other plantations in expoſed ſituations, where they will defend the other trees in winter, and thereby greatly promote their growth.

The timber of this tree is very tough and flexible, and therefore might be converted to many uſeful purpoſes, when ſuffered to grow to a proper ſize: the principal uſes it has hitherto been applied to is turnery ware, for which it is excellent; and alſo for mill-cogs, beetle-heads, &c.

HORN-WORK, in fortification, a ſort of outwork, advancing towards the field, to cover a curtain, baſtion, or other place ſuſpected to be weak, as alſo to poſſeſs an eminence, &c.

It conſiſts of two demi-baſtions joined by a curtain; its flanks are uſually parallel, though, ſometimes, they contract towards the place, forming a queue d'yronde, or ſwallow's tail. When the flanks are too long, ſometimes epaulements are made to flank them. The parts next the country are to be defended by a parapet. Two horn-works joined together make a crown-work.

HORNET, *Crabo*, in zoology, a ſpecies of apis with a black thorax, and double black ſpots on the ſegments of the body. See the article APIS.

HOROGRAPHY, the ſame with dialling. See the article DIAL.

HOROLOGIUM, a general name for inſtruments to meaſure the hours, as a watch, clock, dial, &c. See the articles WATCH, CLOCK, &c.

HOROPTER, in optics, a right line drawn through the point where the two optic axes meet, parallel to that which joins the centers of both the eyes.

HOROSCOPE, in aſtrology, the point of the heavens riſing above the eaſtern point of the horizon, at any given time when a prediction is to be made of a future event; as the fortune of a perſon then born, the ſucceſs of a deſign, &c.

It alſo denotes a figure of the twelve houſes, or twelve ſigns of the zodiac, wherein the diſpoſition of the heavens is marked for the time given.

Lunar HOROSCOPE, the point from whence the moon proceeds when the ſun is in the aſcending point of the eaſt.

HORSE, *Equus*, in zoology, a well known quadruped, the characters of which are theſe: the fore-teeth are ſix in number, the upper ones incurvated, and the inferior prominent: the canine teeth are not exerted, and are on each ſide ſeparated by a ſpace from the teeth: the hoof is undivided, and the teats are two, and placed in the groin.

The horſe is one of the nobleſt quadrupeds we are acquainted with. In ſtrength and natural fierceneſs, he is inferior to few, and yet eaſily tamed. The head is long and large; the eyes large and prominent; the ears erect and beautiful; the neck is long and thick, and elegantly decorated with a mane; the body is rounded and beautifully turned; the legs are ſtrong, without being bulky; and the tail is long, and hairy all the way; the hairs being like thoſe of the mane, only longer, thicker, and more beautiful.

Though the moſt experienced horſemen are not always agreed in ſome points relating to the ſhape, make, and goings of a horſe, yet they almoſt always accord in this, that there ought to be a juſt proportion in all his parts. That even when he is taken to pieces, and examined ſingly in his particular members, though ſome defects may appear, yet when they all bear a juſt correſpondence one to another, and concur in ſuch a manner as to render his action eaſy, juſt, and regular, ſuch a horſe cannot be greatly diſagreeable, but will, for the moſt part, move well, and with a tolerable good grace. On the other hand, ſuppoſe a horſe has ſome parts exquiſitely fine, and others indifferent, which frequently happens, it will mar his beauty, and cauſe him to look diſagreeable, and for the moſt part affect his gait and action.

In order to have a horſe beautiful and finely made, it has been agreed on all hands, that his head ſhould not be long nor too large, rather lean than fleſhy; his ears thin and narrow, and of a becoming length, well ſet on, pointing inwards; his brow or forehead not too broad and flat; his noſe ſomewhat riſing, and of a good turn; his noſtrils wide and thin; his muzzle ſmall; his mouth neither deep nor too ſhallow; with a ſtar or ſnip down his forehead, or a blaze, which is no way unbecoming, unleſs it be too large and diſproportioned.

Horſes that are thus marked, have generally one or more of their feet white, which is alſo very beautiful, and looks lively. His jaws ſhould be thin and ſufficiently wide, not approaching too near together, nor too high upwards towards the onſet, that he may have ſufficient room to carry his head eaſy, and in good place; his eyes well formed, ſprightly, and of a middle ſize; his neck ſhould be arched towards the middle, ariſing by a beautiful gradation out of his breaſt and ſhoulders, the muſcles thereof diſtinct, but no where overcharged with fleſh, growing ſmaller and thinner as it approaches towards his head; his ſhoulders ſhould be thin from the withers, with a gradual enlargement downwards, that his boſom or breaſt be not too narrow nor too groſs; his fore-legs ſtraight and well placed; his joints lean and bony; his knees not bending, and his paſterns not too long; his feet round and ſmooth, and his ſinews firm and well braced; his carcaſe rather round than flat; his back not too low, and for ſtrength and durableneſs pretty even and ſtraight; his ribs rather home than open, as they approach towards his haunches; his buttocks round, and the muſcles not too fleſhy, but diſtinct; his hocks or gambrels neither ſtanding too wide nor too near together; his hocks ſhould be lean and no wiſe puffed or fleſhy; his paſterns ſhort, his legs flat and thin; and his tail ſet on in a good place, rather high than low, riſing upon every motion of his body. The more theſe properties concur in any horſe, the more beautiful he muſt be, eſpecially when they correſpond and agree in due proportion, one to another; and the more a horſe is wanting in theſe, the more plain an ordinary he will appear.

Horse-Chesnut, *Eſculus*, in botany, a tree with digitated leaves; the flowers grow in beautiful ſpikes, and come out in May, each conſiſting of five roundiſh petals, with narrow ungues inſerted in the cup: the ſtamina are ſeven ſubulated filaments topped with riſing antheræ: the fruit is a coriaceous roundiſh capſule beſet with ſpines, opening with three cells, in which are contained one or two globular nuts, of a bright mahogany colour.

This tree was formerly planted in avenues: the grandeſt we know of is in Buſhy-Park; but they have a much better appearance when planted ſingly, as the natural growth of them is obtuſely pyramidical, the under branches being always greatly extended, and the ſucceeding ones gradually decreaſing to the top.

It is propagated by planting the nuts early in the ſpring, and afterwards managed like the common cheſnut, obſerving, in tranſplanting them, not to ſhorten any of the branches.

Horſe-cheſnut trees were originally brought from Conſtantinople to England; and although they are natives of ſo warm a climate, yet they reſiſt the cold of the ſevereſt winters we have here, and grow to be very large.

The fruit of this tree is very bitter, and the only uſe they are applied to here, is to feed deer, who are very fond of them; ſo that in large parks it is very proper to have a number of horſe-cheſnut trees, as they are not only ornamental but uſeful.

Horse-Dung, in gardening, is of particular uſe for hot-beds; whereby cucumbers, melons, aſparagus, ſallads, and other delicacies, are attained early in the ſpring; for which purpoſe no other ſort of dung will do ſo well, if mixed with litter and aſhes, as this; and when rotten will make a good manure for cold lands.

HORSE-Radish, a well known ſpecies of cochlearia; it is propagated by cuttings or buds from the ſides of the old roots; the ſeaſon for this work is in October or February, the former for dry lands, and the latter month for wet: the ground where they are deſigned to be planted ſhould be well trenched and broke, after which a trench ſhould be made a foot deep, in the bottom of which the ſets ſhould be placed with their buds upwards, at about four or five inches aſunder, covering them with the earth which comes out of the next trench, and ſo continuing on till the intended piece of ground is finiſhed. The ſecond year the roots will be fit for uſe.

Horse-Shoe, in fortification, is a ſmall work ſometimes of a round and ſometimes of an oval figure, incloſed with a parapet, ſometimes raiſed in a moat or ditch, or in low grounds, and ſometimes to cover a gate, or to ſerve as a lodgment for ſoldiers.

Horse-Shoe-Head, a diſeaſe in infants, in which the ſutures of the ſkull lie too open.

This is commonly a ſign of a weak conſtitution, and a ſhort life. The nurſes uſually embrocate the parts affected with brandy or rum, to which ſome add the white of an egg, or palm oil.

Horse-tail, in botany. See Equisetum.

Horse, in a military ſenſe, the ſame with cavalry. See the article Cavalry.

The light-horſe, in an army, are all the regiments of horſe, except the guards.

Horse, among ſeamen, a rope faſtened to the yards in two places, for the men to tread on, and ſecure themſelves by, as they go out on the yard-arms to furl, reef, or looſen the ſails.

Horse is alſo a rope drawn very tight perpendicularly cloſe to the maſt to hoiſt ſome ſail upon, as the try-ſail of a ſnow, the ſquare-ſail of a ſchooner, &c.

Horse is likewiſe a name given by ſeamen to a ſhort reed thruſt into the bung of a caſk, or keg, to draw off brandy, gin, &c.

HORTICULTURE, the ſame with gardening. See Garden and Gardening.

HORTUS Siccus, a dry-garden, an appellation given to a collection of ſpecimens of plants carefully dried and preſerved.

HOSANNA, in the Hebrew ceremonies, a prayer which they rehearſed on the ſeveral days of their feaſt of tabernacles.

The word is Hebrew, and literally ſignifies *ſave us now*, or, *ſave us*, *we pray*.

HOSE, in commerce. See the article Stocking.

HOSEA, a canonical book of the Old Teſtament, ſo called from the prophet of that name, its author, who was the ſon of Beri, and the firſt of the leſſer prophets. He lived in the kingdom of Samaria, and delivered his prophecies under the reign of Jereboam II. and his ſucceſſors, kings of Iſrael, and under the reigns of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah. His principal deſign is to publiſh the groſs idolatries of the people of Iſrael and Judah, to denounce the divine vengeance againſt them, and to foretel the captivity in Aſſyria.

HOSPITAL, a place or building properly endowed, or otherwiſe ſupported by charitable contributions, for the reception and ſupport of the poor, aged, infirm, ſick, or helpleſs.

Camp-Hospitals are either general or regimental. The general hoſpitals are of two kind, viz. the flying hoſpital, attending the camp at ſome convenient diſtance; and the ſtationary hoſpital, which is fixed at one place. In the choice of both, Dr. Pringle thinks it better to have them in towns than villages, as the former will afford larger wards, beſides more of other conveniencies. Theſe wards ſhould be as airy as poſſible. Regimental hoſpitals are of the greateſt importance, and therefore ſhould be ſupplied with blankets and medicines from the public ſtores, with an allowance alſo for nurſes and other neceſſaries. Barns, ſtables, granaries, and other out-houſes, but above all, churches, make the beſt hoſpitals from the beginning of June to October.

Hospital-Fever, a name given to a malignant catarrhal fever, as being frequent in hoſpitals. See the article Malignant Fever.

HOSPITALLERS, an order of religious knights, now known by the title of the knights of Malta. See the article Malta.

HOST, *Hoſpes*, denotes either a perſon who entertains another, or the perſon ſo entertained; but it is now generally uſed in the firſt of theſe ſenſes.

Host, or Hoast, *Hoſtia*, in the church of Rome, a name given to the elements uſed in the euchariſt, or rather to the conſecrated wafer; which they pretend to offer up every day, a new hoſt or ſacrifice, for the ſins of mankind.

HOSTAGE, a perſon given up to an enemy as a ſecurity for the performance of the articles of a treaty.

HOSTILITY denotes a ſtate of war or enmity between two nations.

During a truce all acts of hoſtility are to ceaſe on both ſides.

HOT-BATH. See the article Bath.

HOT-Beds, in gardening, beds made with freſh horſe-dung, or tanners bark, and covered with glaſſes to defend them from the cold winds.—By the ſkilful management of hot-beds we may imitate the temperature of warmer climates, by which means the ſeeds of plants brought from any of the countries within the torrid zone may be made to grow and flouriſh. Beds made of horſe-dung are proper to make the ſeeds of different plants to come up ſoon, particularly thoſe that require a very ſtrong heat; but as this heat is not ſo permanent as that of tanners bark, the laſt mentioned is to be preferred. As to the method of making hot-beds, it is better ſeen than deſcribed, as is likewiſe the management of them.

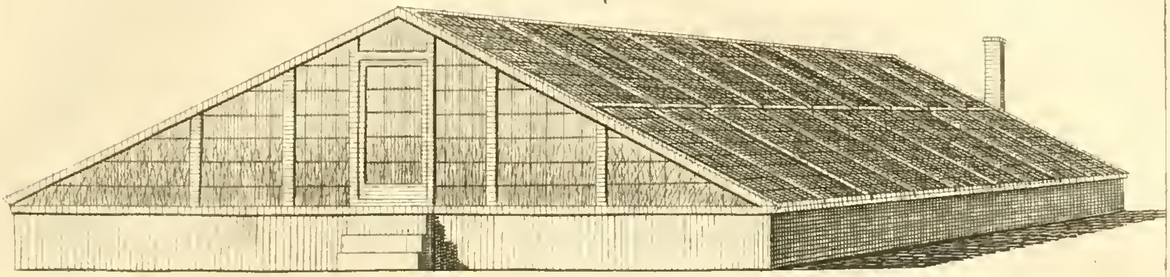
HOT-HOUSE, in ſalt-making, the place where they dry the ſalt, when taken out of the boiling pan: it is ſituated near the furnace, which, by means of funnels or tubes, conveys a heat into it.

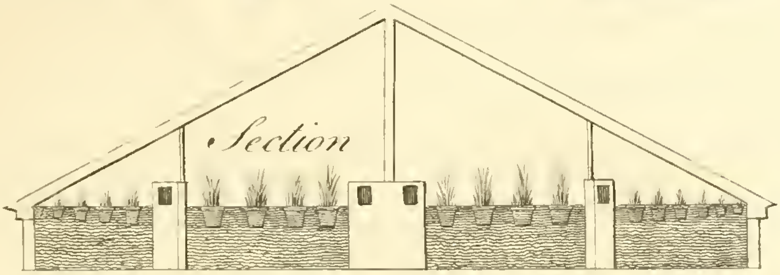
Hot-House, or ſtove, in gardening, a conſervatory for the preſervation of tender exotic plants. In plate LXII. is exhibited a view of a hot-houſe peculiarly adapted for raiſing and bringing to perfection the ananas, or pine-apple. In the ground plan *a a a a*, are four pits for containing the bark, in which the plants are plunged; the two middle pits are for fruiting plants, the other two may be uſed for ſmall plants called Succeſſion, or, if not, they are well adapted for melons: *b b* are the fire places, covered with ſheds; the dark parts round the two inner pits repreſent the flues which terminate at the chimneys built over the fire places. The ſection and perſpective view are ſo obvious that they require no references, as the ſcale will determine all the parts.

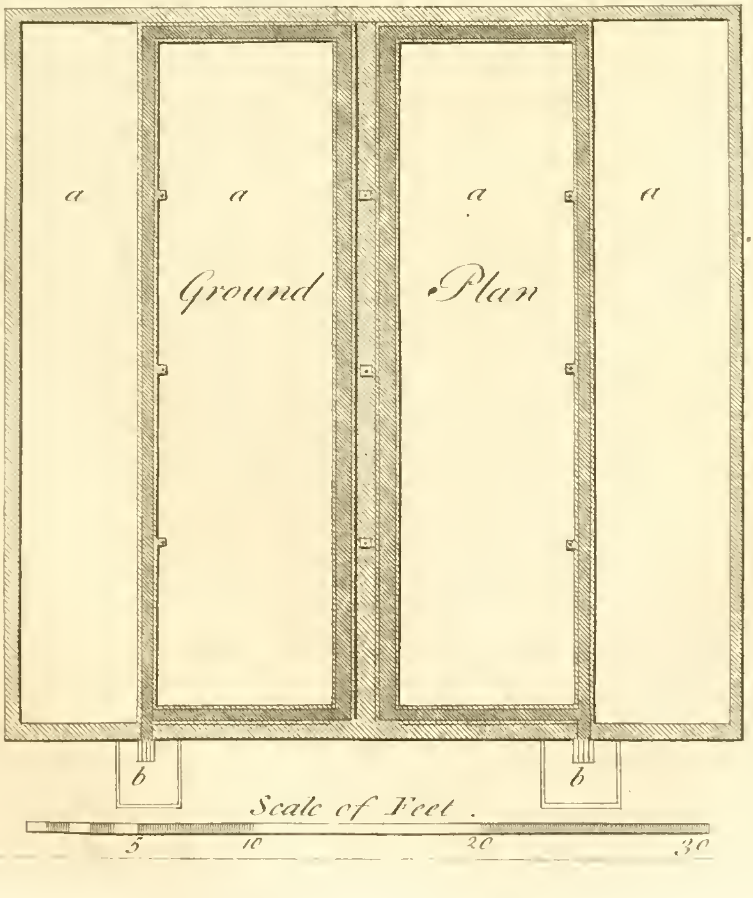
As this conſtruction ſeems to be out of the common way of building of hot-houſes, it may therefore be objected to; but we can ſee but little inconvenience in it; and as to the conveniency attending the welfare of the plants, we think it better than thoſe built in the common forms; for, in the firſt place, this will have the morning ſun ſooner, and the evening ſun later, than the other ſort, and

PLATE LXII. Facing Hothouse.

A Perspective View of a Hothouse.







likewiſe the mid-day ſun; and although the rays at that time will fall obliquely, we think it of ſervice in very hot days, at which times the common ſtoves are obliged to be ſhaded, to prevent the plants from being burnt, but in this conſtruction it is not neceſſary: alſo in winter, when the ſun iſſues but little warmth except at noon, then the upright glaſſes in front receive the rays almoſt perpendicularly; whereas in the common ſtoves the obliquity of the glaſſes render the rays inefficacious, being of no other uſe but to tranſmit light. Another conveniency attends this new form, that is, the air can be admitted at either ſide, according to the wind, or both, in very hot weather, which cannot be done by the other; and likewiſe in very cold weather, the windward ſide can be kept covered (either with canvas or ſhutters, which are neceſſary for both on nights) while the other ſide is open, it will therefore have both warmth and light. We muſt therefore be of a ſtrong opinion, that this conſtruction, if put in execution, will anſwer all the purpoſes intended, and ſhall remain in the ſame mind till it is proved to the contrary.

For a plan and deſcription of one of the beſt common hot-houſes ſee the article STOVE.

HOTCH-POT, in law, is uſed for mixing of lands given in marriage with other lands in fee which fall by deſcent; as where a man poſſeſſed of thirty acres of land has iſſue only two daughters, and after his having given with one of them ten acres in marriage, he dies poſſeſſed of the other twenty: here ſhe that is thus married, in order to gain her ſhare of the reſt of the land, muſt put her part given in marriage in hotch-pot; that is, ſhe muſt refuſe to take the ſole profits of her lands, and cauſe it to be mingled with the other, ſo that an equal diviſion may be made of the whole between her and her ſiſter; by which means, inſtead of only her ten acres, ſhe has fifteen.

HOTTONIA, water violet, in botany, an aquatic plant, growing in ſtanding waters in many parts of England; the leaves are finely winged, the flower-ſtalks riſe a little above the water; they are naked, and towards the top have two or three whorles of flowers, each of which is monopetalous and ſaucer-ſhaped. The fruit is a globoſe pointed capſule, with one cell containing a number of round ſeeds.

HOTTS, or HUTTS, are the pounces and round balls of leather, ſtuffed, and tied to the ſpurs of fighting cocks, to keep them from hurting one another in ſparring.

HOUND, a hunting dog, of which there are ſeveral ſorts, as the grey-hound, gaze-hound, and the blood-hound.

HOUNDS *of the Maſt*, in the ſea-language, thoſe parts of the upper-end or head of a maſt upon which the cheeks are bolted to ſupport the truſſel-trees. See the articles MAST and TRUSSEL-TREES.

HOUR, *Hora*, a meaſure of time, ſome part of a natural day, uſually a twenty-fourth and twelfth, &c. With us it is equal to the twenty-fourth part of the earth's diurnal rotation. Each hour is divided into ſixty minutes, and each minute into ſixty ſeconds, &c. Fifteen degrees of the equator anſwer to an hour.

The word is derived from the Latin *hora*, which ſignifies the ſame thing.

The ancient Hebrews did not divide the day into hours, but into four parts, as morning, high-day or noon, midnight, and morning watch. In the New Teſtament we find the day divided into twelve hours; but though they were equal to each other, yet they were unequal with reſpect to the different ſeaſons: thus the twelve hours of the longeſt day in ſummer were made longer than thoſe of the ſhorteſt days in winter. Herodotus ſays, that the Greeks learned from the Egyptians the method of dividing the day into twelve parts, the riſe of which cuſtom among the latter was, becauſe their prieſts were wont, twelve times a day, to cry aloud with a howling noiſe to their cynocephalus; and Cicero and Marius Victorinus have taken notice of ſuch a ceremony to Serapis.

Cenſorinus obſerves, that the word hour was not known among the Romans three hundred years after the building of the city, as there is no mention made of it in the twelve tables, as is done in the other laws after that time; before which, the diviſions were only before and after noon. The diviſion of the day and night into twenty-four hours was not known among them before the firſt Punic war. They divided the twelve hours of the day into four parts, as prime, which began at ſix o'clock; third, at nine; ſixth, at twelve; and ninth, at three. They alſo divided the night into four watches, each watch containing three hours.

The Turks not having any clocks, their prieſts, ſtopping their ears with their fingers, proclaim with a very loud voice from the top of their moſques, the cock-crow, break of day, noon-tide, three o'clock, and the twilight. The ſame cuſtom we find prevailed among the Romans, as appears from Martial;

Horas quinque, puer, nondum tibi nunciat.

The aſtronomers of Cathaya, &c. ſtill retain, according to biſhop Beveridge, the diviſion of the day into twelve parts, and give the name of ſome animal to each hour.

Hours are divided into equal and unequal; equal hours are the twenty-fourth part of a day and night preciſely, that is, the time when 15° of the equator mount above the horizon; they are alſo called equinoctial hours, as being meaſured on the equinoctial; and aſtronomical, becauſe uſed by aſtronomers, and reckoned from noon in a continued ſeries of twenty-four.

HOUSE, *Domus*, a habitation, or place built with conveniencies for dwelling in: thus we ſay, a town-houſe, country-houſe, &c.

House-Bote, in law, an allowance of timber out of the lord's woods, for the repairs of a houſe: this is otherwiſe called eſtovers.

House, in aſtrology, denotes the twelfth part of the heavens.

House-Breaking, or Robbing, is the breaking into and robbing a houſe in the day-time; the ſame crime being termed burglary, when done by night; both are felony, without benefit of clergy.

Green-House. See the article Green-*Houſe*.

House-Leek, ſedum, in botany. See the article Sedum.

HOUSING, among bricklayers, a term uſed for a tile or brick that is warped, or caſt crooked or hollow in burning.

Tiles are apt to be houſing or hollow on the ſtruck ſide, or that which was uppermoſt in the mould, and bricks on the contrary ſide.

HOUSTONIA, in botany, a genus of plants whoſe flower is monopetalous and funnel-ſhaped, with four ſtamina. The fruit is a roundiſh bivalvular capſule, with two cells, each containing a ſingle ſeed.

HOWKER, in the Dutch marine, a veſſel with two maſts, uſed in the coaſting trade.

HUCKSTER, a perſon who ſells proviſions, or ſmall ware, by retail.

HUE and Cry, in law, the purſuit of a perſon who has committed felony on the highway.

If the party robbed, or any in the company of a perſon either robbed or murdered, go to the conſtable of the next town, and require him to raiſe hue and cry, and to purſue the offender, deſcribing him, and giving an account as near as he can, of the courſe he ſteered; the conſtable is immediately to call upon the pariſh for aid in ſeeking after the felon; and if he cannot be found within the bounds of that pariſh, then he is to give the next conſtable warning; and he the next, till the offender be apprehended, or at leaſt purſued to the ſea ſide. If perſons are not ready at the ſummons of the ſheriff, and cry of the county, to engage in the purſuit, they may be fined: and in caſe the inhabitants of any hundred, after hue and cry is made, neglect to purſue the ſame, they ſhall be liable to pay one half of the damages recoverable againſt the hundred in which the robbery was committed.

HUGONIA, in botany, a genus of plants, whoſe flower conſiſts of five large roundiſh patent petals, with ten ſubulated filaments topped with twin antheræ. The fruit is a globoſe drupe, containing a hard ſtriated nut.

HUGUENOTS, a name given by way of contempt to the Calviniſts of France.

The name had its riſe in the year 1560; but authors are not agreed as to its origin. The moſt plauſible opinion, however, is that of Paſquier, who obſerves, that at Tours, the place where they were firſt thus denominated, the people had a notion, that an apparition or hobgoblin, called king Hugon, ſtrolled about the ſtreets in the night-time; from whence, as thoſe of the reformed religion met chiefly in the night to pray, &c. they called them Huguenots; that is, the diſciples of king Hugon.

HULK, in the marine, an old ſhip of war properly fitted with a very high maſt, firmly ſupported by various props and ſhrouds, to hoiſt in and out the maſts of other men of war occaſionally; alſo an old ſhip of any kind.

HULL, in ſhip-building, the hull or lower frame of a ſhip, excluſive of the ſuperſtructure, viz. the maſts, ſails, and rigging.

Hull-To, the ſituation of a ſhip lying-to at ſea, without any ſail ſet. See the article Trying.

HUMAN, in general, is an appellation given to whatever relates to mankind: thus we ſay, the human ſoul, human body, human laws, &c. See the articles Soul and Body.

HUMANITY, the peculiar nature of man, whereby he is diſtinguiſhed from all other beings. See the article Man.

Humanities, in the plural, ſignify grammar, rhetoric, and poetry, known by the name of *literæ humaniores*; for teaching of which, there are profeſſors in the univerſities of Scotland, called humaniſts. See the articles Grammar, Rhetoric, &c.

HUMBLE-BEE, the Engliſh name of ſeveral ſpecies of apis, diſtinguiſhed by their colours, black, tawny, reddiſh, &c. See the article Apis.

HUMECTATION, in pharmacy, the moiſtening or preparing medicines by ſteeping them in water; either to ſoften and relax their ſolid parts, or to prevent the evaporation of their more ſubtile contents.

HUMERUS, in anatomy, the upper part of the arm between the ſcapula and elbow.

The os humeri or brachii, as it is called, is articulated at one end with the ſcapula, and at the other end to the ulna and radius. See the articles Arm, Brachium, &c.

As to the motion of the os humeri, it is evidently the moſt free and extenſive of that of any bone in the human body; being furniſhed with ſeveral flexor and extenſor muſcles. See the articles Flexor and Extensor.

HUMIDITY, that quality in bodies whereby they are capable of wetting other bodies. This differs very much from fluidity, and ſeems to be merely a relative thing depending upon the congruity of the component particles of the liquor to the pores of ſuch particular bodies, as it is capable of adhering to, penetrating a little into, or wetting.

HUMIDUM Radicale, or *Radical Moiſture*, among phyſicians, ſeems to amount to no more than the pureſt and moſt delicate part of the nutritious matter in a condition to be aſſimilated.

By too much heat, as in fevers, hectics, &c. this humidity is too haſtily exhauſted and ſpent.

HUMILIS Musculus, one of the depreſſor-muſcles of the eye.

HUMMING-BIRD, *Trochilus*, in ornithology, a genus of birds, of the order of the paſſeres, remarkable for being the ſmalleſt of all known birds. Their beak is of a ſubulated figure, but fine as a thread: it is longer than the head, and not perfectly ſtrait: add to this, that they have a fine tube or pipe, which they can extend beyond the point of the beak. Of this ſingular genus, there are ſeveral elegant ſpecies.

HUMORISTS, *Gli Humoriſti*, a celebrated academy of learned men at Rome, firſt eſtabliſhed by Paul Mancini. The device of this academy is a cloud; which being raiſed on vapours from the ſalt-water of the ſea, returns again freſh, with this hemiſtich from Lucretius, *Redit agmine dulci.*

HUMOROSI, the name of another academy at Cortona in Italy, which muſt not be confounded with that of the Humoriſts.

HUMOUR, *Humor*, in a general ſenſe, denotes much the ſame with liquid or fluid. See the article Fluid.

The ancients ſeem to have called the nutritious juices the radical humour; and to have conſtituted as a cauſe of diſeaſes, a diſproportion betwixt the innate heat and radical moiſture or humour. They alſo made four humours in the blood. See the article Blood.

Humours *of the Eye*, are the cryſtalline, vitreous, and aqueous; for a deſcription of which, ſee the articles Eye, Crystalline, &c.

Humour is alſo uſed for the peculiar temper of a perſon, ariſing from the conſtitution and prevalence of this or that humour. See the articles Constitution and Temperament.

Humour, in dramatic poetry, is eſteemed a ſubordinate ſpecies of what is more uſually called manners. See Manners.

Every paſſion wears two differenr faces; one ſerious and ſolemn, fit only for tragedy; and the other merry and ridiculous, called humour, and proper for comedy. The Engliſh poets have excelled thoſe of all other nations in this particular; and, indeed, ours is the only language that has a name for it.

To be always witty only becomes a few characters; ſo that it is neceſſary to call in the aſſiſtance of humour, to prevent the other dramatic perſons from going into the common ſtyle and manner: hence humour may be looked on as the true ſpirit and wit of comedy. See the article Wit.

HUMULUS, the hop, in botany. See the article Hop.

HUNDRED, *Centum*, *Cent.* is ten times ten, or the ſquare of ten. It makes the third place from the right to the left, in the table of numeration.

The proportion of the profits in commerce is reckoned by the hundred, or ſo much per cent.

Hundred, *Hundredum*, *Centuria*, a certain diviſion or part of a ſhire or county.

HUNGARICUS Morbus, a diſeaſe ſo called from its being firſt obſerved in the imperial army; in 1556.

It is thought to have been a compound fever, partaking of the nature both of the bilious and malignant fevers. See Bilious and Malignant.

HUNGARY-Water, a diſtilled water, ſo denominated from a queen of Hungary, for whoſe uſe it was firſt prepared.

Quincy gives the following directions for making it:—Take of freſh gathered flowers of roſemary, two pounds; rectified ſpirit of wine, two quarts; put them together, and diſtil them immediately in balneo.

Or, Take of freſh tops of roſemary, one pound and a half; proof ſpirit, one gallon; and diſtil in balneo till five pints are obtained.

HUNGER, an uneaſy ſenſation, which creates an appetite or deſire for food. See the article Food.

Hunger is by ſome attributed to a ſharp acrimonious humour, which vellicates the coats of the ſtomach; others, who deny the exiſtence of any ſuch liquor, attribute it to the attrition or rubbing of the coats of the ſtomach; and others, again, account for it from the acidity of the blood.

HUNGRY Evil, among farriers, an exceſſive deſire in horſes to eat, which ſometimes proceeds from catching cold, or from travelling long in froſt and ſnow, or through barren places.

For the cure, give him great ſlices of bread, toaſted and ſteeped in ſack, to comfort his ſtomach; or give him wheat flour in wine or milk, a quart at a time. But there is nothing better than to feed him moderately ſeveral times a day with good bean-bread well baked, or with oats well dried and ſifted.

HUNTING, the exerciſe or diverſion of purſuing four-footed beaſts of game. See the article Game.

HUOY, a veſſel uſed to load and unload large ſhips, either in the king's or merchants ſervice; alſo a ſmall Dutch ſhip, with a main-maſt and mizen-maſt.

HURA, in botany, a genus of plants whoſe flowers are male and female, growing on the ſame plant; the male-flowers are apetalous, being an imbricated amentum, principally compoſed of cylindrical filaments, terminated with ſeſſile antheræ lying over each other: the female flower is deſtitute of a corolla, being compoſed of a ſwelling cylindrical calyx: the ſtyle is long, and terminated with a large funnel-ſhaped ſtigma: the fruit is an orbicular ligneous pericarpium, conſiſting of twelve cells, each containing a ſingle ſeed of a roundiſh compreſſed form.

We know only one ſpecies of this genus, which riſes with a ſoft woody ſtem, abounding with a milky juice, and furniſhed with heart-ſhaped leaves indented on their edges. It grows naturally in the Weſt-Indies, where it is called the ſand-box tree, the ſhells being uſed to contain ſand for writing.

HURDLES, in fortification, twigs of willows or oſiers interwoven cloſe together, ſuſtained by long ſtakes, and uſually laden with earth.

Hurdles, called alſo clays, are made in the figure of a long ſquare; the length being five or ſix feet, and the breadth three, or three and a half: the cloſer they are woven, the better. They ſerve to render batteries firm, or to conſolidate the paſſage over muddy ditches; or to cover traverſes and lodgments, for the defence of the workmen, againſt the fire-works, or the ſtones that may be thrown againſt them.

HURDLES, in huſbandry, certain frames, made either of ſplit timber, or of hazle-rods, wattled together, to ſerve for gates in incloſures, or to make ſheep-folds, &c.

HURDS, or HORDS, *of Flax*, or *Hemp*, the coarſer parts ſeparated in the dreſſings, from the tear or fine ſtuff.

HURLE-BONE, in a horſe, a bone near the middle of the buttock, very apt to go out of its ſockets with a hurt or ſtrain.

HURRICANE, a furious ſtorm of wind, owing to a contrariety of winds. See the articles WIND and WHIRL-WIND.

HUSBAND, *Maritus*, a man joined or contracted with a woman in marriage.

HUSBANDRY, the buſineſs or employment of a farmer, or perſon who cultivates land, &c. See AGRICULTURE.

Huſbandry is divided into two kinds, and diſtinguiſhed by the epithets old and new. The former is that which has been practiſed in all countries from the moſt early times; and the latter that introduced by the ingenious Mr. Tull, and often called the horſe-hoeing huſbandry.

Experience ſhews, that land, though ever ſo well tilled in the autumn, when wheat, for example, is ſown, hardens and ſaddens in the winter; its particles, beaten down by heavy rains, and ſunk by their own weight, approach each other daily more and more; the roots of the plants cultivated have conſequently leſs and leſs room to extend themſelves in queſt of their neceſſary food; and the interſtices in the earth become of courſe ſo few and cloſe, that they are not able to pierce through them; whilſt weeds ſpring up, and rob them of their nouriſhment. By this means the earth, reduced to nearly the ſame condition as if it had not been ploughed at all, is unable to aſſiſt the plants ſown in it, in the ſpring, when they ought to ſhoot with the greateſt vigour. They conſequently then ſtand moſt of all in need of the plough, to deſtroy the weeds, to lay freſh earth to their roots in the room of that which they have exhauſted, to break the particles of the ground anew, ſo as to enable their roots to ſpread, in order to their gathering an ample proviſion of food, which then does them the greateſt ſervice.

The editors of the laſt edition of Mr. Tull's Horſe-Hoeing Huſbandry give, in their preface to that work, the following comparative calculation of the expence and profit of the old method of culture and the new, drawn up by a gentleman who has practiſed both for ſome years, and who has no attachment to the new huſbandry, farther than he has found it anſwer in his trials. They candidly appeal to experience, "whether every article in this calculation is not eſtimated in favour of the common huſbandry; whether the expence be not rated lower than moſt farmers find it; and whether the crop be not ſuch as they would rejoice to ſee, but ſeldom do.

"In the new huſbandry, every article is put to its full value, and the crop of each year is computed four buſhels ſhort of the other; though, in ſeveral years experience, it has equalled, and generally exceeded, thoſe of the neighbourhood in the old way."

An Eſtimate of the Expence and Profit of Ten Acres of Land, in Twenty years.

I. In the Old Way.

	l.	s.	d.	l.	s.	d.
Firſt year for wheat coſts 33 l. 5 s. viz.						
Firſt ploughing, at 6 s. per acre	3	0	0			
Second and third ditto, at 8s. per acre — — —	4	0	0			
Manure, 30 s. per acre. ——	15	0	0	22	0	0
Two harrowings and ſowings, at 2 s. 6 d. per acre — —	1	5	0			
Seed, three buſhels per acre, at 4 s. per buſhel — —	6	0	0			
Weeding, at 2 s. per acre —	1	0	0			
Reaping, binding, and carrying in, at 6 s. per acre ——	3	0	0	11	5	0
Second year for barley coſts 11 l. 6 s. 8 d.						
Once ploughing, at 6 s. per acre	3	0	0			
Harrowing and ſowing, at 1 s. 6 d. per acre —— ——	0	15	0			
Seed, four buſhels per acre, at 2 s. per buſhel — —	4	0	0			
Weeding, at 1 s. per acre —	0	10	0			
Cutting, raking, and carrying, at 3 s. 2 d. per acre ——	1	11	8			
Graſs-ſeeds, at 3 s. per acre —	1	10	0	11	6	8
				44	11	8

	l.	s.	d.
Third and fourth years lying in graſs coſt nothing.			
So that the expence of ten acres in four years comes to 44 l. 11 s. 8 d. and in twenty years to	222	18	4
Firſt year's produce is half a load of wheat per acre, at 7 l. per acre — — — —	35	0	0
Second year's produce is two quarters of barley per acre, at 1 l. per acre ———	20	0	0
Third and fourth years graſs is valued at 1 l. 10 s. per acre	15	0	0
So that the produce of ten acres in four years is — —	70	0	0
And in twenty years it will be	350	0	0
Deduct the expence ———	222	18	4
And there remains clear profit on ten acres in twenty years by the old way — —	127	1	8

II. In the New Way.

	l.	s.	d.	l.	s.	d.
Firſt year's extraordinary expence is,						
For ploughing and manuring the land, the ſame as in the old way — — —				22	0	0
Ploughing once more, at 4 s. per acre — — —	2	0	0			
Seed, nine gallons per acre, at 4 s. per buſhel ———	2	5	0			
Drilling, at 7 d. per acre —	0	5	10			
Hand-hoeing and weeding, at 2 s. 6 d. per acre — —	1	5	0			
Horſe-hoeing, ſix times, at 10 s. per acre — — —	5	0	0			
Reaping, binding, and carrying in, at 6 s. per acre ——	3	0	0			
The ſtanding annual charge on ten acres is — —	13	15	10			
Therefore the expence on ten acres in twenty years is —				275	16	8
Add the extraordinaries of the firſt year, and the ſum is —				297	16	8
The yearly produce is at leaſt two quarters of wheat per acre, at 1 s. 8 d. per quarter, which on ten acres in twenty years, amounts to — —				560	0	0
Therefore, all things paid, there remains clear profit on ten acres in twenty years, by the new way — — —				262	3	4

" So that the profit on ten acres of land in twenty years, in the new way, exceeds that in the old by one hundred and thirty-five pounds, one ſhilling, and eight-pence, and conſequently is conſiderably more than double thereof: an ample encouragement to practiſe a method whereby ſo great advantage will ariſe from ſo ſmall a quantity of land, in the compaſs of twenty-one years leaſe; one year being allowed, both in the old and new way of preparing the ground.

" It ought withal to be obſerved, that Mr. Tull's huſbandry requires no manure at all, though we have here, to prevent objections, allowed the charge thereof for the firſt year; and moreover, that tho' the crop of wheat from the drill-plough is here put only at two quarters on an acre, yet Mr. Tull himſelf, by actual experiment and meaſure, found the produce of his drilled wheat crop amount to almoſt four quarters on an acre: and, as he has delivered this fact upon his own knowledge, ſo there is no reaſon to doubt of his veracity, which has never yet been called in queſtion. But that we might not be ſuppoſed to have any prejudice in favour of his ſcheme, we have choſen to take the calculations of others rather than his, having no other view in what we have ſaid, than to promote the cauſe of truth, and the public welfare."

HUSK, the ſame with what botaniſts call the calyx, or cup of a flower. See the article Calyx.

HUSSARS, a kind of irregular cavalry, armed with the ſabre and bayonet, are retained in the ſervice of moſt princes on the continent.

HUSSITES, the diſciples of John Huſs, a Bohemian, and curate of the chapel of Bethlehem at Prague; who, about the year 1414, embraced and defended the opinion of Wickliff of England, for which he was cited before the council of Conſtance, and, refuſing to renounce his ſuppoſed errors, he was condemned to be burnt alive, which ſentence was accordingly executed upon him at Conſtance.

HYACINTH, hyacinthus, in botany, a genus of plants, whoſe root is bulbous, with ſmooth long leaves, which ariſe immediately from the root. The flowers are produced in ſpikes, placed alternately, each conſiſting of a monopetalous campanulated corolla, divided into ſix reflexed ſegments at the limb, with three nectariums, placed on the top of the germen. The ſtamina are ſix ſhort ſubulated filaments, topped with connivent antheræ.

The fruit is a roundiſh triquetrous, divided into three cells, each of which uſually contains two roundiſh ſeeds.

The double hyacinths, of which there are great variety, are much eſteemed for their fragrancy and beauty. They are propagated by offſets, or from ſeeds.

Hyacinth, in natural hiſtory, a genus of pellucid gems, whoſe colour is red, with an admixture of yellow.

HYACINTHIA, an ancient Grecian feſtival, obſerved at Amyclæ in Laconia, in the month Hecatombæon, in memory of the beautiful young Hyacinthus, ſon of Amyclos, king of Sparta.

HYADES, in aſtronomy, ſeven ſtars in the head of the bull, famous among the poets for bringing on rain both at the riſing and ſetting.

The work is Greek, and derived from υω, to rain.

The principal of them is in the left eye, by the Arabs, called Aldebaran.

HYDATIS, in medicine, a little tranſparent veſicle, or bladder full of water, which is ſometimes found ſingly, and ſometimes in cluſters, upon the liver, and various other parts, eſpecially in dropſical conſtitutions.

HYDATOIDES, the ſame with the aqueous humour of the eye. See Eye.

HYDATOSCOPY, *Hydatoſcopia*, called alſo Hydromancy, in antiquity, a kind of divination, or method of foretelling future events by means of water.

The word is Greek, and formed of υδαlος, the genitive of υδωρ, water, and σκοπεω, to view or conſider.

HYDNUM, in botany, a genus of cryptogamious plants, of the order of fungi, called by Dillenius erinaceus. It has an horizontal fungus, echinated or beſet with ſubulated fibres on its under part.

HYDRA, in aſtronomy, a ſouthern conſtellation imagined to repreſent a water-ſerpent.

The number of ſtars in this conſtellation in Ptolemy's catalogue is twenty-five, and in the Britannic catalogue ſixty-eight.

HYDRAGOGUES, purgative medicines that evacuate a large quantity of watery or ſerous humour.

The word is formed from the Greek, υδραγωγος, and derived from υδωρ, water, and αγω, to drive, or bring away.

In general all ſudorific, aperient, and diuretic medicines are hydragogues.

HYDRANGEA, in botany, a genus of plants whoſe flower conſiſts of five roundiſh equal petals, with ten ſtamina.

The fruit is a roundiſh didymous capſule; the two premanent ſtyle make two beaks to it, and is rendered angular by many ribs: it is coronated by the cup, and divided into two cells by a tranſverſe membrane. The ſeeds are numerous, angular, acuminated, and very ſmall.

HYDRARGYRUM, a name given to mercury or quickſilver. See the article Mercury.

HYDRASTIS, in botany, a genus of plants whoſe flower conſiſts of three ovate regular petals. The filaments are numerous, linear, compreſſed, and topped with obtuſe antheræ. The fruit is an oblong, compound, acinated berry: and the ſeeds are oblong and ſolitary.

HYDRAULICS, that part of ſtatics which conſiders the motion of fluids, with the application thereof, particularly in artificial water-works.

HYDRELÆUM, in pharmacy, a mixture of oil and water, which Galen reckons refrigerating.

The word is Greek, and compounded of υδωρ, water, and ελαιον, oil.

Taken inwardly, it provokes vomiting; and, externally, it is anodyne, and promotes ſuppuration.

HYDRENTEROCELE, in ſurgery, a kind of tumor or hernia, where there is a dropſy of the ſcrotum, complicated with a deſcent of the inteſtine.

The word is Greek, and compounded of υδωρ, water, εντερον, an inteſtine, and κηλη, a tumor.

HYDROCANISTERIUM, an engine which ſpouts water in great quantities, and to conſiderable heights, in order to extinguiſh accidental fires in houſes. See Engine.

HYDROCELE, *Hernia*, in ſurgery, a ſwelling or dropſy in the ſcrotum. See Hernia.

HYDROCEPHALUS, in ſurgery, a preternatural tumor of the head ariſing from preternatural lymph.

It is of two ſorts, internal and external; internal, when the water is collected within the bones of the cranium; external, when retained between the ſkin and cranium. The firſt kind is rarely ſeen but in new-born infants, who are generally in great danger: for, upon an inciſion, the lymph is no ſooner diſcharged, than the infant dies, as experience has too often convinced us. If the diſtemper be recent, it will be more adviſeable to repeat gentle purges; whilſt a large compreſs, dipped in lime-water, ſpirit of lavender, or Hungary-water, is applied outwardly.

HYDROCHARIS, the little water-lilly, in botany, a genus of plants, the male flower of which has a ſpatha, and is compoſed of three large, plain, and roundiſh petals; the female flower is like the male one, only without any ſpatha: the fruit is a coriaceous and roundiſh capſule, conſiſting of ſix cells, in which are contained a great number of very ſmall and roundiſh ſeeds.

HYDROCOTYLE, marſh-penny-wort, in botany, a genus of plants, the univerſal corolla of which is uniform in figure, though not in ſituation; and the ſingle corolla are formed of five ovato-acute, patent petals: the fruit is orbicular, erect, and compoſed of two compreſſed and ſemi-orbicular ſeeds.

This plant is common with us in damp places, and is ſuſpected of hurting ſheep that feed on it; whence it is ſometimes called white-rot.

HYDROGRAPHY, that part of geography which conſiders the ſea as it is navigable.

The word is Greek, and derived from υδωρ, water, and γραφω, to deſcribe.

It teaches how to meaſure the ſea; gives an account of its tides, counter-tides, currents, ſoundings, bays, &c. as alſo its rocks, ſhelves, ſands, promontories, harbours, diſtances from port to port, with every thing remarkable out at ſea, or on the coaſt.

HYDROMANCY, the art of foretelling future events by means of water; the ſame as hydatoſcopy.

The word is Greek, and formed of ὑδωρ, the water, and μαντεια, divination.

The other kinds of divination relative to fire, air, and earth, are denominated pyromancy, aeromancy, and geomancy.

HYDROMEL, *Hydromeli*, among phyſicians, water impregnated with honey, either before or after fermentation: that made by fermentation is called vinous hydromel, or mead, and is eſteemed good for the gravel. See HONEY.

The word is Greek, and compounded of ὑδωρ, water, and μελι, honey.

HYDROMETER, an inſtrument to meaſure the gravity, denſity, velocity, force, &c. of water and other fluids. See the articles WATER and FLUID.

The hydrometer is one of the moſt uſeful inſtruments of the philoſophic kind; for though the hydroſtatical ballance be the moſt general inſtrument for finding the ſpecific gravities of all ſorts of bodies, yet the hydrometer is beſt ſuited to find thoſe of fluids in particular, both as to eaſe and expedition.

This inſtrument ſhould be made of copper, ſince ivory imbibes ſpirituous liquors, and thereby alters its gravity; and glaſs is apt to break. The moſt ſimple kind, uſed for finding the ſtrength of ſpirits, conſiſts of a copper-ball B *b* (plate LXI. *fig.* 3.) with a braſs-wire, A B, $\frac{1}{4}$ of an inch thick, ſoldered into it. The upper part of this wire, being filed flat on one ſide, is marked proof at *m*, becauſe it ſinks exactly to this mark in proof-ſpirits. There are other two marks at A and B, to ſhew whether the liquor be $\frac{1}{10}$ above or below proof, according as the hydrometer ſinks to A or emerges to B, when a braſs-weight as C or K has been ſcrewed on at the bottom *c*. There are alſo weights to be ſcrewed on, for ſhewing the ſpecific gravities of fluids quite to common water. The round part of the wire above the ball, may be marked ſo as to repreſent river-water when it ſinks to R W, (*fig.* 4.) the weight which fits the inſtrument for river-water being ſcrewed on at *c*: alſo when put into ſpring-water, mineral-water, ſea-water, and water of ſalt-ſprings, it will emerge or riſe gradually to the marks S P, M I, S E, S A; and, on the contrary, when put into Briſtol-water, rain-water, port-wine, and mountain-wine, it will ſucceſſively ſink to the marks *b r*, *r a*, *p o*, *m o*.

Another kind, which ſerves to diſtinguiſh the ſpecific differences of fluids to great nicety, conſiſts of a large hollow ball B, (*fig.* 5.) with a ſmaller ball *b* under it, partly filled with quick-ſilver or ſmall ſhot, and ſcrewed on to the lower part of the former, in order to render it but little ſpecifically lighter than water; it has alſo a ſmall ſhort neck at C, into which is ſcrewed the graduated braſs-wire A C, which by its weight cauſes the body of the inſtrument to deſcend in the fluid, with part of the ſtem.

When this inſtrument is ſwimming in the liquor, contained in the jar I L M K, the part of the fluid diſplaced by it, will be equal in bulk to the part of the inſtrument under water, and equal in weight to that of the whole inſtrument. Suppoſe the weight of the whole were 4000 grains, then it is evident we can by this means compare together the different bulks of 4000 grains of various ſorts of fluids. For if the weight A be ſuch as ſhall cauſe the aræometer to ſink in rain-water, till its ſurface comes to the middle point of the ſtem 20; and if, after this, it be immerſed in common ſpring-water, and the ſurface is obſerved to ſtand $\frac{1}{10}$ of an inch below the middle point 20; it is evident that the ſame weight of each water differs in bulk only by the magnitude of $\frac{1}{10}$ of an inch in the ſtem.

Now ſuppoſe the ſtem were ten inches long, and weighed one hundred grains, then every tenth of an inch would be one grain weight; and ſince the ſtem is of braſs, and braſs is about eight times heavier than water, the ſame bulk of water will be equal to $\frac{1}{8}$ of a grain; and conſequently to the $\frac{1}{8}$ of $\frac{1}{4000}$ part, that is, a 32000th part of the whole bulk, which is a degree of exactneſs as great as can be deſired. Yet the inſtrument is capable of ſtill greater exactneſs, by making the ſtem or neck conſiſt of a flat thin ſlip of braſs, inſtead of one that is round or cylindrical: by this means we increaſe the ſurface, which is the moſt requiſite thing; and diminiſh the ſolidity, by which the inſtrument is rendered more exact.

In order to adapt this inſtrument to all ſorts of uſes, there ought to be two different ſtems to ſcrew on and off in a ſmall hole at *a*. One ſtem ſhould be ſuch a nice thin ſlip of braſs, or rather of ſteel, like a watch-ſpring ſet ſtraight, as we have juſt mentioned, on one ſide of which ought to be the ſeveral marks or diviſions, to which it will ſink in various ſorts of waters, as rain-water, river-water, ſpring-water, ſalt ſpring-water, &c. And on the other ſide you mark the diviſion to which it ſinks in various lighter fluid, as hot Bath-water, Briſtol-water, Lincomb-water, Chelton-water, port-wine, mountain, madeira, and various other ſorts of wine. But in this caſe the weight A on the top muſt be a little leſs than before, when it was uſed for the heavier waters.

But, in caſe of trying the ſtrength of ſpirituous liquors, a common cylindric ſtem will do beſt, becauſe of its ſtrength and ſteadineſs; and this ought to be ſo contrived that, when immerſed in what is called proof-ſpirit, the ſurface of the ſpirit may be upon the middle point 20; which is eaſily done by duly adjuſting the ſmall weight A on the top, and making the ſtem of ſuch a length that, when immerſed in water, it may juſt cover the ball, and riſe to *a*; but, when immerſed in pure ſpirit, it may ariſe to the top at A; then by dividing the upper and lower parts *a* 20, A 20, into ten equal parts each, when the inſtrument is immerſed in any ſort of ſpirituous liquor, it will immediately ſhew how much it is above or below proof.

This proof ſpirit conſiſts of half water and half alcohol, or pure ſpirit, that is, ſuch as when poured upon gun-powder, and ſet on fire, will burn all away, and permit the powder to take fire, which it will, and flaſh as in the open air. But if the ſpirit be not ſo highly rectified, there will remain ſome phlegm or water, which will make the powder wet, and unfit to take fire. This proof-ſpirit of any kind, weighs ſeven pounds twelve ounces per gallon.

The common method of ſhaking the ſpirits in a vial, and by raiſing a crown of bubbles, to judge by the manner of their riſing or breaking away whether the ſpirit be proof or near it, is very precarious, and capable of great fallacy. There is no way ſo eaſy, quick, certain, and philoſophical, as this by the aræometer, which will demonſtrate infallibly the difference of bulks, and conſequently ſpecific gravities, in equal weights of ſpirits, to the 30, 40, or 50 thouſandth part of the whole, which is a degree of accuracy, beyond which nothing can be deſired.

HYDROMETRY, *Hydrometria*, the menſuration of fluids, their gravity, velocity, quantity, &c.

The word is of the ſame original with the preceding. It includes both hydroſtatics and hydraulics.

HYDROMPHALUS, in medicine and ſurgery, a tumor of the navel, containing water. See the article HERNIA.

HYDROPARASTATÆ, a ſect of heretics, the followers of Tatian.

This ſect was called alſo Encratitæ, Apotactitæ, Saccophori, Severiani, and Aquarians.

The hydroparaſtatæ were a branch of the Manichees, whoſe diſtinguiſhing tenet was, that water ſhould be uſed in the euchariſt inſtead of wine.

HYDROPHOBIA, in medicine, a dread of water, which is a ſymptom ariſing in a perſon who has been bitten by a mad dog, or other mad animal.

The word is Greek, and compounded of *υδωρ*, water, and *φοβεω*, to fear.

The ſymptom is not peculiar to this diſtemper, though it be always an attendant; for we meet with ſeveral inſtances of fevers accompanied with a dread of water.

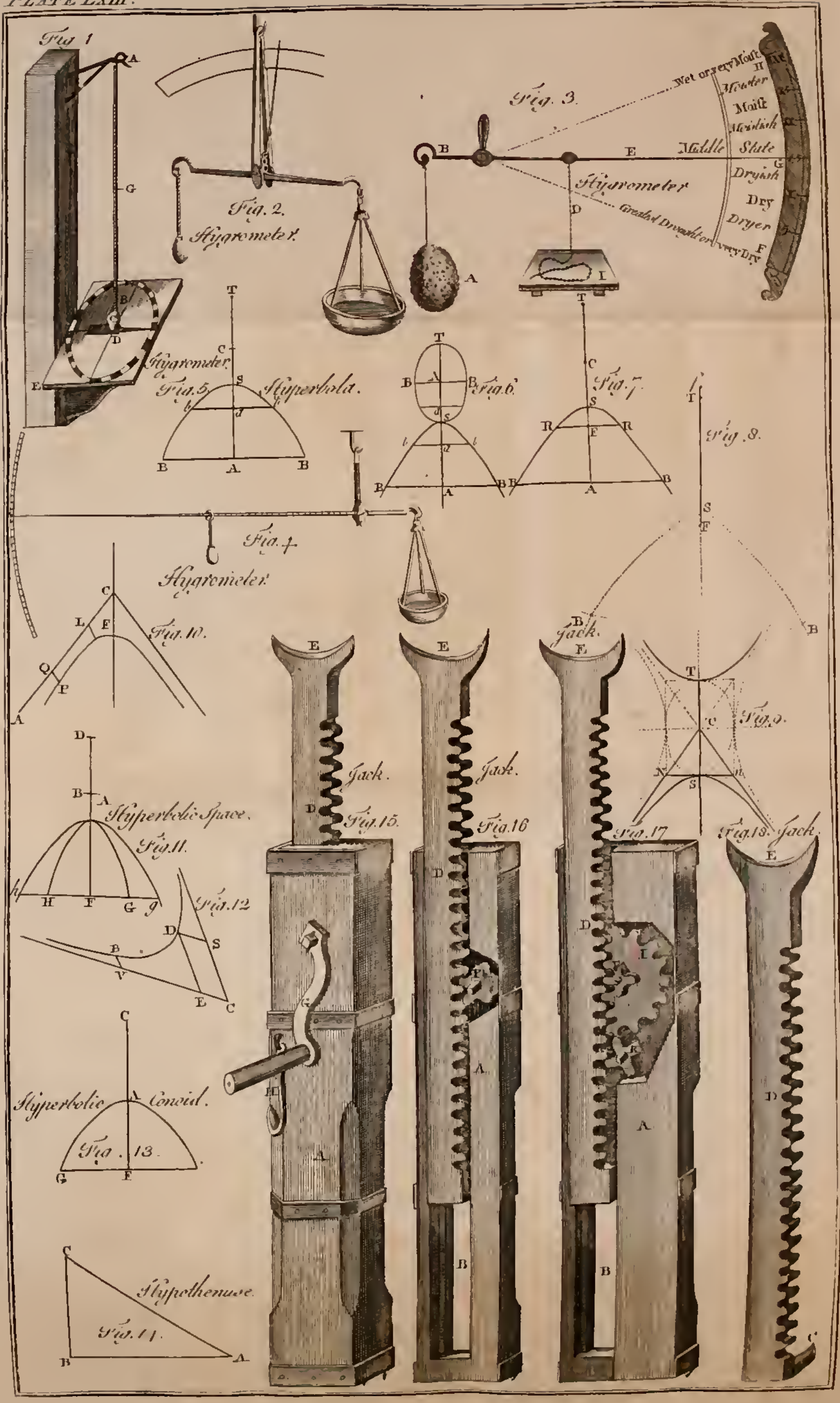
In a perſon affected with this diſorder, among other extraordinary ſymptoms, the approach of any liquor to the body, eſpecially to the tongue and lips, produces an incredible uneaſineſs, trembling, convulſions, and a ſtate next to direct madneſs; and at the ſame time the patient is racked with an inſatiable thirſt.

In general, Boerhaave affirms, that there is no certain preſervative againſt this diſorder yet known; and that there is no example, that can be depended upon, of any one having been recovered, who was once ſo far gone as to dread water. This author adds, that it is much to be lamented, that after the common methods have been put in practice perpetually without ſucceſs, for ſo many ages, others have not been tried. All the celebrated remedies for this purpoſe, he adds, owe their reputation either to barren ſpeculation, or too great confidence in the reports of others.

His own directions, however, are, 1. As ſoon as the poiſon is received into the body, the part affected, and thoſe adjacent thereto, ſhould have deep ſcarifications made in them. Then large cupping-glaſſes to be applied, or the part to be burnt pretty deep with the actual cautery, and afterwards kept in continual ſuppuration. During the whole of this time, the part is, without interruption, to be fomented with a pickle of ſea-ſalt and vinegar. 2. The cloaths, &c. which have come near the poiſon to be thrown away. 3. The patient is, immediately after receiving the misfortune, to be thrown headlong into the ſea, or ſome river, with threatening words, and other circumſtances capable of ſtriking terror into him; for which purpoſe he is frequently to be immerſed in the water, and again taken up: for the good effects are only produced by the dread and conſternation into which the mind is thrown. He is frequently to be purged with rhubarb, agaric, and the juice of elder bark. 4. Let the patient have a gentle ſweat excited every morning before eating. 5. His feet and hands are to be daily fomented in a bath of water. Laſtly, let him frequently drink cold water, till he vomit it up: uſe acidulated liquors often: his diet muſt be moiſt, light, and laxative, and take them ſo liberally as to vomit them again. He muſt abſtain from large quantities of aromatic ſubſtances, wine, &c. violent exerciſe of body, and all commotions of mind.

The cure is principally to be attempted in the firſt ſtage, or the beginning of the ſecond. It ſeems probable, ſays he, the following method may be of ſome efficacy, eſpecially as it is confirmed by ſome few experiments. Immediately upon the ſigns of approaching madneſs, the caſe is to be treated as extremely inflammatory; wherefore a large quantity of blood muſt be taken away by a large orifice, even till the patient is faint: then directly inject nitrous clyſters, mixed with a little vinegar. Let theſe be repeated boldly, and more frequently than is conſiſtent with prudence in other caſes. After this, the eyes are to be blindfolded, and he thrown into a cold pond, or cold water thrown upon him, till he be no longer afraid of it. Then let him be im-

PLATE LXIII. Facing Hygrometer



immediately forced to drink a large quantity of water ; and toward the evening of the ſame day let a ſleep be procured.

We have an account of remedies for this malady in the Philoſophical Tranſactions; one of which is the lichen cinereus terreſtris, or aſh-coloured liverwort, which has been taken into the College Diſpenſatory, under the title of *Pulvis Antilyſſus*, and is the celebrated remedy publiſhed by Dr. Mead, with ſome variation in the proportion of the pepper. The directions, as made public, are, firſt to take away nine or ten ounces of blood; and then take of powdered aſh-coloured liverwort, four drams, and of the powder of black pepper, two drams: mix theſe together, and divide into four doſes; one of which is to be taken faſting for four days ſucceſſively, in half a pint of tepid cow's milk. After taking theſe four doſes, the patient is to be put faſting every morning for a month, either into a cold bath, cold ſpring, or river, remaining therein with his head above water, not longer than half a minute, if the water be exceſſively cold. Then let him bathe thrice a week for fifteen days.

Boerhaave, in his Aphoriſms, treating of the canine madneſs, would have us not to deſpair of diſcovering a peculiar antidote againſt this ſingular kind of poiſon: and this, ſays he, we are encouraged to hope for, from the certain inſtances we already have of remedies effectual againſt particular ſorts of poiſon. Accordingly he had a mind to try what effect mercury would have upon animals under canine madneſs; and from ſeveral experiments, he found it prove ſucceſsful, by adminiſtring ſome grains of turpeth mineral made into boluſes. He alſo mentions the remedy which M. Deſault tried with conſtant ſucceſs in the hydrophobia, which is a mercurial ointment made of one third part of mercury revived from cinnabar, one third part of human fat, and as much of hog's lard. One or two drams of this ointment at a time ſhould be rubbed by intervals, or ſucceſſively, upon and about the wound. As a farther confirmation of the efficacy of mercury in the canine madneſs, he takes notice of a medicine Mr. Cobb, of Buſſelton, near Briſtol, brought from Tonquin, which is much celebrated in the Eaſt-Indies as efficacious in this diſtemper; this is a native and factitious cinnabar, of each twenty-four grains; muſk ſixteen grains, powdered and mixed well together. This powder is to be taken all at once in a tea-cup of arrack, which is ſaid to ſecure the patient for thirty days: after which time the doſe is to be repeated in the ſame manner; but it ſhould be done as ſoon as poſſible after the bite is received: but if the patient have any ſymptoms of the diſeaſe, the ſecond doſe muſt be repeated three hours after the firſt; and this is ſaid to be ſufficient for a cure.

HYDROPHYLLUM, in botany, a genus of plants, whoſe flower conſiſts of a monopetalous campanulated corolla, divided into five ſegments; the ſtamina are compoſed of five ſubulated filaments terminated by oblong incumbent antheræ. The fruit is a globoſe unilocular capſule, with two valves, incloſing a large roundiſh ſeed.

HYDROPIC, a dropſical patient; or a perſon ſwelled and bloated with abundance of water. See the article DROPSY.

HYDROPOTA, in medicine, a perſon who drinks nothing but water.

It has long been controverted among phyſicians, whether or no the hydropotæ live longer than other perſons.

HYDROPS, in medicine, the ſame with dropſy. See the article DROPSY.

HYDROSCOPE, an inſtrument anciently uſed for the meaſuring of time.

The hydroſcope was a kind of water-clock, conſiſting of a cylindrical tube, conical at bottom; the cylinder was graduated, or marked out with diviſions, to which the top of the water becoming ſucceſſively contiguous, as it trickled out at the vertex of the cone, pointed out the hour. See CLEPSYDRA.

HYDROSTATICAL BALLANCE, a kind of ballance contrived for the eaſy and exact finding the ſpecific gravities of bodies, both liquid and ſolid. See the article *Hydroſtatical* BALLANCE.

HYDROSTATICS, that part of mechanics which conſiders the gravity and æquilibrium of fluid bodies, particularly water, and of ſolid bodies immerſed therein.

The word is Greek, and compounded of *υδωρ*, water, and *ϛατικη*, the ſcience of weights, which is derived from *ιϛημι*, to eſtabliſh or determine.

Mr. Boyle has applied hydroſtatics in examining and proving the goodneſs and purity of metals, minerals, &c. particularly fluids, in his Hydroſtatica. See *Hydroſtatical* BALLANCE.

As to the laws of hydroſtatics, with the application thereof, ſee FLUID.

HYGIEINE, that branch of medicine which preſcribes rules for the preſervation of health; it may be divided into prophylactice, which foreſees and prevents diſeaſes; ſynteritice, employed in preſerving health; and analeptice, whoſe office is to reſtore health.

The word is Greek, *υγιεινη*, and derived from *υγιης*, ſound.

HYGROMETER, or HYGROSCOPE, a machine whereby to meaſure the degrees of dryneſs or moiſture of the air.

The word is Greek, and compounded of *υγρος*, moiſt, and *μετρεω*, to meaſure.

In the Philoſophical Tranſactions we have ſeveral methods of conſtructing hygroſcopes.

Mr. Molyneux gives the following:—A B (plate LXIII *fig.* 1.) is a whipcord about four feet long, tied faſt to the end of the hook A. At the end of this whipcord hangs the weight 6, about a pound, or ſomething more: this weight is ſo fitted at the end to receive and carry the index D. Under theſe there is placed a graduated circle on the board E F, fixed by a bracket againſt the wall.

The moiſture of the air twiſts the cord, and gives a motion to the index over the diviſions in the graduated circle; and again, as the air grows more dry, the cord untwiſts, and brings back the index by a contrary motion. The rope A B ſhortens and lifts up the weight C by way of a ſcrew, and conſequently muſt give a circular motion to the index.

One of the grand defects of all hygrometers, hitherto invented, is, that they grow weak with age, and do not ſo nicely obey the alterations of the air. The alterations alſo of the air may give this kind of hygroſcope more than one turn. To remedy this, the index D has two complete turns: the point A, as being fixed, has no turn; therefore the middle point G has but one turn; and conſequently, if it be hung up at the point G, or no longer than G D, half the former length, the index D will have but one turn. What is here ſaid of two turns, and the middle point G, may be accommodated to any other number of turns and points in the cord.

Mr. Gould obſerves, that when oil of vitriol is ſaturated in the moiſteſt weather, it afterwards retains or loſes its acquired ſtate, as the air proves more or leſs moiſt. Thus one grain, after its full increaſe, often varied the equilibrium ſo ſenſably, that the tongue of the ballance of $1\frac{1}{2}$ inch long, deſcribed an arch of variation to $\frac{1}{3}$ of an inch compaſs; which arch would have been $2\frac{2}{3}$ inches, had the tongue been but one foot in length, even with that little quantity of liquor: ſo that, if more liquor expanded under a large ſurface be made uſe of, the minuteſt alteration of weather muſt needs very much affect it; and a bare pair of ſcales will afford a hygroſcope as nice, perhaps, as any yet known.

This balance may be contrived two ways; either ſuch whoſe pin ſhould be in the middle of the beam (*fig.* 2.) with a very ſlender tapering tongue of a foot or a foot and a half long, pointing to the diviſions on a broad arched plate, fixed above in the handle; or elſe the ſcale with the liquor may be hung to a point of the beam (*fig.* 3.) very near the pin, and the other extreme made ſo long as to mark a large arch on a board placed conveniently for that purpoſe. The ſcale in either may be a concave glaſs of four or five inches diameter. Laſtly, on the diviſion of the arches ſhould be inſcribed the different temparature of the air ſhewn by the liquor.

The above author imagines oil of ſulphur per campanum, as alſo oil of tartar per deliquium, and the liquor of fixed nitre, &c. might ſucceed as well as oil of vitriol.

Another hygroſcope, he ſays, may be made of a viol ſtring running upon pullies, and ſuſpending a bullet fixed to the ſhorter end of an index, whoſe other extremity is ſo long as to deſcribe a long arch by the falling and riſing of the bullet upon the ſtretching and ſhrinking of the ſtring; which would be the more nice, were the index faſtened to the center.

But among all the inventions, the following ſeems beſt calculated both for diſpatch and accuracy:

A (*fig.* 4) repreſents a thin piece of ſponge, ſo cut as to contain as large a ſuperficies as poſſible. This hangs by a fine thread of ſilk, upon the beam B, and is exactly balanced from another thread of ſilk at D, ſtrung with the ſmalleſt lead ſhot, at equal diſtances, and ſo adjuſted as to cauſe the index E to point at G, in the middle of the graduated arch F, G, H, when the air is in the middle ſtate, between the greateſt moiſture and the greateſt dryneſs. I, ſhews a little table or ſhelf for that part of the ſilk or ſhot which is not ſuſpended to reſt upon.

The words hygroſcope and hygrometer are commonly both uſed in the ſame ſenſe. However, Wolfius makes ſome difference betwixt an hygroſcope and an hygrometer, ariſing from the etymology; the former only ſhewing the alterations of the air, in reſpect of humidity and dryneſs; and the latter meaſuring them.

The word hogroſcope is Greek, and compounded of *υγρος*, moiſt, and *σκοπεω*, to view, or conſider.

HYLE, or Hylec, among alchemiſts, denotes their firſt matter, or the original chaos of things.

HYLEG, or Hylech, in aſtrology, ſignifies a planet, or the point in the heavens, which at a perſon's nativity, is accounted the ſignification of life. See the article Nativity.

HYMEN, in anatomy, ſignifies a membrane in general; but it is commonly taken for that circular membranous fold, with which the anterior extremity of the great canal in virgins, and eſpecially before the firſt eruption of the menſes, is commonly bordered. This fold is of different breadths, more or leſs ſmooth, and ſometimes ſemi-lunar; and in ſome ſubject leaves but a very ſmall opening, in others a larger; and in all renders the external orifice narrower than the reſt of the cavity. The hymen is formed by the union of the internal membrane of the great canal with that on the inſide of the alæ; it is commonly ruptured after the conſummation of marriage; is quite loſt in delivery; and afterwards only ſome irregular portions of it remain, which, from their ſuppoſed reſemblance to myrtle leaves, have been termed carunculæ myrtiformes. This circle may alſo ſuffer ſome diſorder by two great a flux of the menſes and other particular accidents. *Winſlow.*

HYMENÆA, in botany, a genus of plants whoſe flower is papilionaceous; the fruit is a large ligumen, or pod, of an ovato-oblong figure, with nu-

numerous oval ſeeds ſurrounded with fibres, and a farinaceous matter.

We know but of one ſpecies belonging to this genus, which is a large ſpreading tree growing in plenty in the Weſt-Indies, where it is called the locuſt-tree, the wood of which is eſteemed as good timber as any that part of the world produces; it yields a fine clear reſin (which makes an excellent varniſh) and is called gum anime, in the ſhops. See the article ANIME.

HYMN, a religious ſong. The hymns ſung in the Chriſtian church, as diſtinguiſhed from the pſalms, are pieces of poetry compoſed by pious, but not inſpired, authors.

HYOIDES, in anatomy, a forked bone at the root of the tongue; it is ſituated in the middle ſpace between the angles of the lower jaw; it is a little bone, and reſembles, in ſome meaſure, the baſis of the lower jaw.

HYOSCYAMUS, henbane, in botany, a genus of plants whoſe flower is monopetalous and funnel-ſhaped; the tube is cylindrical, and the corolla is erect and ſpreading, lightly divided into five obtuſe ſegments, one being broader than the reſt; it hath five ſubulated filaments, topped with roundiſh antheræ. The fruit is an ovate obtuſe capſule, with a line marked on each ſide; it contains two cells with numerous ſeeds.

The common henbane, which grows wild on dunghills, &c. is of a very poiſonous quality; it is therefore dangerous to uſe it internally, though its ſeeds have been recommended by ſome in a hæmoptoſis and hæmorrhages; but great caution ſhould be uſed in regard to the quantity preſcribed.

HYOTHYROIDES, in anatomy, a muſcle of the larynx, which ſerves to raiſe it, and conſtringe the glottis.

HYPÆTHROS, or HYPÆTHRON, in ancient architecture, a kind of temple open at the top.

Vitruvius ſays, it was an open building or portico, which had no roof or covering, as the temple of Jupiter Olympius, built by Caſſatius, a Roman architect at Athens.

HYPALLAGE, among grammarians, a ſpecies of hyperbaton, conſiſting in a mutual permutation of one caſe for another.

HYPATA, in ancient muſic, an appellation given to the loweſt chord of a tetrachord.

HYPECOUM, in botany, a genus of plants whoſe flower conſiſts of four petals: the two exterior petals are broad, trilobated, and obtuſe, and are placed oppoſite. The two interior ones ſtand alternately with the others: they are lightly divided into three ſegments, of which the middle one is hollow, compreſſed and erect. The ſtamina are four in number. And the fruit is a long, compreſſed, jointed pod, which is incurved, containing one roundiſh compreſſed ſeed in each joint.

HYPER, ὑπερ, a Greek prepoſition, frequently uſed in compoſition, where it denotes exceſs; its literal ſignification being above, or beyond.

HYPERBATON, in grammar, a figurative conſtruction inverting the natural and proper order of words and ſentences. The ſeveral ſpecies of the hyperbaton are the anaſtrophe, the hyſteron proteron, the hypallage, ſynchyſis, tmeſis, parentheſis, and the hyperbaton, ſtrictly ſo called. See ANASTROPHE, &c.

HYPERBATON, ſtrictly ſo called, is a long retention of the verb, which completes the ſentence.

HYPERBOLA, in geometry, one of the curve lines formed by the ſection of a cone. See CONIC *Sections*.

The plane of every hyperbola, is proportioned by this general theorem:

"As the ſum of the tranſverſe and any abſciſſa, multiplied into that abſciſſa, is to the ſquare of its ſemi-ordinate; ſo is the ſum of the tranſverſe and any other abſciſſa, multiplied into the abſciſſa, to the ſquare of its ſemi-ordinate."

That is, if TS (plate LXIII. *fig.* 5.) be the tranverſe diameter, and S*a*, SA, abſciſſas, and *ba*, BA, ſemi-ordinates: then is $Ta = TS + Sa$, and $TA = TS + SA$. And it will be $Ta \times Sa : \square ba :: TA \times SA : \square BA$. That is, $TS + Sa \times Sa : \square ba :: TS + SA \times SA : \square BA$.

Theſe proportions are the common property of every hyperbola, and differ only from thoſe of the ellipſis in the ſigns + and —. See ELLIPSIS.

That is, if we ſuppoſe TS (*fig.* 6.) the tranſverſe diameter, common to both ſections, viz. both the ellipſis and hyperbola.

Then in the ellipſis it will be $TS - Sa \times Sa : \square ab :: TS - SA \times SA : \square AB$. And in the hyperbola it is $TS + Sa \times Sa : \square ab :: TS + SA \times SA : \square AB$ as above.

And therefore all that is further required in the hyperbola may be found as in the ellipſis, due regard being had to the changing of the ſigns.

To find the latus rectum or right parameter of any hyperbola.

From the laſt proportion, take any of the antecedents and its conſequent, viz. either $Ta \times Sa : \square ab$. Or, $TA \times SA : \square AB$. To them bring in the tranſverſe TS, for a third term, and by thoſe three find a fourth proportional, as in the ellipſis, and that will be the latus rectum.

To find the focus of any hyperbola.

The focus being that point in the hyperbola's axis, through which the latus rectum muſt paſs, as in the ellipſis and parabola, it may be found by this theorem:

"To the rectangle made of half the tranſverſe into half the lactus rectum, add the ſquare of half the tranſverſe; the ſquare root of that ſum will be the diſtance of the focus, from the center of the hyperbola."

To

To deſcribe an hyperbola in plano.

In order to the eaſy deſcribing of an hyperbola in plano, it will be convenient to premiſe the following propoſition, which differs from that of the ellipſis only in the ſigns.

Prop. If from the focus of any hyperbola there be drawn two right-lines, ſo as to meet each other in any point of the hyperbola's curve; the difference of thoſe lines (in the ellipſis it is their ſum) will be equal to the tranſverſe diameter.

That is, if F (*fig.* 7.) be the focus, and it be made $Cf = CF$; then the point f is ſaid to be a focus out of the ſection (or rather of the oppoſite ſection) and it will be $fB - FB = TS$.

If this propoſition be truly underſtood, it muſt needs be eaſy to conceive how to deſcribe the curve of any hyperbola very readily by points, when the tranſverſe diameter and the focus are given, or any other data by which they may be found, as in the precedent rules.

Thus: — Draw any ſtraight line at pleaſure, in it ſet off the length of the given tranſverſe T S (*fig.* 8.) and from its extreme points or limits, viz. T, S, ſet off $Tf = SF$, the diſtance of the given focus, viz. the point f, without, and F within the ſection as before; that done, upon the point f, as a center, with any aſſumed radius greater than T S, deſcribe an arch of a circle; then from that radius take the tranſverſe T S, making their difference a ſecond radius, with which, upon the point F, within the ſection, deſcribe another arch to cut or croſs the firſt arch as at B. Then will that point B be in the curve of the hyperbola, by the laſt propoſition. And therefore it is plain, that, proceeding on in this manner, you may find as many points as may be thought convenient, which being all joined together with an even hand will form the hyperbola required.

There are ſeveral other ways of delineating an hyperbola in plano; one way is by finding a competent number of ordinates, but none more eaſy and expeditious than this mechanical way: we ſhall therefore, for brevity's ſake, paſs over the reſt, and leave them to the learner's practice, as being eaſily deduced from what has been already ſaid.

From the compariſons which have been all along made between the hyperbola and the ellipſis, it will be eaſy to perceive the coherence that is between thoſe two figures. But for the better underſtanding of what is meant by the center and aſymptote of an hyperbola, conſider *fig.* 9. where it is evident that the oppoſite hyperbolas will always be alike, becauſe they will always have the ſame tranſverſe diameter common to both, &c. Alſo that the middle point, or common center of the ellipſis, is the common center to all the four conjugal hyperbolas.

And the two diagonals of the right-angled parallelogram which circumſcribes the ellipſis (or is inſcribed to the four hyperbolas) being continued, will be ſuch aſymptotes to thoſe hyperbolas.

HYPERBOLÆON, in ancient muſic, the upper or laſt tetrachord or fourth.

HYPERBOLE, in rhetoric, a figure, whereby the truth and reality of things are exceſſively either enlarged, or diminiſhed. See the article EXAGGERATION.

The word is Greek, *υπερβολη*, *ſuperlatio*, formed of the verb *υπερβαλλοιν*, *ex ſuperare*, to exceed, ſurpaſs by far.

The character of an hyperbole is to exaggerate or extenuate the idea of the things ſpoken of beyond the bounds of truth, or even probability. As, he ran ſwifter than the wind; he went ſlower than a tortoiſe, &c. Hyperboles, ſays Seneca, lye without deceiving; they lead the mind to truth by fictions; they convey the ſentiment intended, though by expreſſing it in terms which render it incredible. The hyperbole promiſes too much, in order to make you conceive enough.

Ariſtotle obſerves, that hyperboles are the favourite figures of young authors, who love exceſs and exaggeration; but that philoſophers ſhould not uſe them without a great deal of reſerve. The pitch to which an hyperbole may be carried, is a point of great delicacy. To carry it too far, is to deſtroy it: it is of the nature of a bowſtring, which by immoderate tenſion, ſlackens; and frequently has an effect quite contrary to that intended.

Thoſe hyperboles are beſt, which are latent, and are not taken for hyperboles. For this reaſon, they ſhould ſcarce ever be uſed but in a paſſion, and in the middle of ſome important incident: ſuch is the hyperbole of Herodotus, ſpeaking of the Lacedæmonians, who fought at Thermopylæ: " They defended themſelves for ſome time with the arms that were left them, and at laſt with their hands and teeth; till the Barbarians, continually ſhooting, buried them, as it were, with their arrows."

Now what likelihood is there, that naked men ſhould defend themſelves with their hands and teeth againſt armed men; and that ſo many perſons ſhould be buried under their enemies arrows? Yet does there appear ſome probability in the thing, by reaſon it is not ſought for the ſake of the figure, but the hyperbole ſeems to ariſe out of the ſubject itſelf. Of the like kind is that paſſage in a comic poet mentioned by Longinus; " He had lands in the country no longer than a Lacedæmonian epiſtle.

HYPERBOLICAL *Cylindroid*, in geometry, a ſolid figure, whoſe generation is given by Sir Chriſtopher Wren, in the Philoſophical Tranſactions, N°. 48.

There are two oppoſite hyperbolas joined by the tranſverſe axis; and through the center there is a right line drawn at right angles to that axis; then the hyperbolas are ſuppoſed to revolve, by which revolution a body will be generated, which he calls an hyperbolical cylindroid; and whoſe baſis, and all ſections parallel to them, will be circles. And in N°. 53, of the Tranſactions, he applies it to the grinding of hyperbolical glaſſes; and he ſays they muſt be either formed this way, or not at all.

Hyperbolic *Space* is the convex area or ſpace contained between the curve of the hyperbola and the external ordinate. If CL $= b$ (plate LXIII. *fig.* 10.) LQ $= x$, CF $= a$, and QP $= y$; then by the nature of the hyperbola $aa = by + xy$ and $y = \frac{aa}{b+x}$, whence $y\dot{x} = \frac{aa\dot{x}}{b+x}$; wherein, if $a = b$, we ſhall have $\frac{a\dot{x}}{a+x}$ for the fluxion of the indefinite area LQPF, whoſe fluent $x - \frac{x^2}{2a^2} + \frac{x^3}{3a^3} - \frac{x^4}{4a^4}$ &c. will when $a = 1$ become $x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{4}x^4 + \frac{1}{5}x^5$, &c. for the area required.

Any hyperbolical ſpace GEHG (*fig.* 11.) is to any other hyperbolic figure of the ſame height $gEhg$ (whoſe latus rectum and tranverſe diameter, as in the circle, are equal, and alſo both equal to DE the tranſverſe diameter of the former ſpace) as the conjugate axis AB is to the tranſverſe axis DE. The area of any aſymptotical hyperbolic ſpace DEVB (*fig.* 12.) may be found by means of the logarithms. Take the differences of the logarithms of the numbers expreſſing the ratio of DE to BV, and find the logarithm of that difference, to which add the conſtant logarithm 0,3622156887; and the ſum will be the logarithm of a number expreſſing the ſpace EDVB, in ſuch parts as the oblong CD is 10000000000.

Hyperbolic *Conoid*, is a ſolid generated by the entire rotation of the hyperbolic ſpace FAG (*fig.* 13.) about the part AF of the tranſverſe axis.

If AC be the ſemi-tranſverſe axis, it will be as 2AC+AF is to 3AC+AF, ſo is the cone whoſe baſe is the circle deſcribed by FG, and altitude AF, to the conoid deſcribed as before. To prove this, let AC$=a$, AF$=x$, FG$=y$, the latus rectum $=b$, and ,7854$=p$; then $y^2 = bx + \frac{bxx}{2a}$; therefore $\frac{4pbx^2}{2} + \frac{2pbx^3}{3a}$ will expreſs the ſolidity of the conoid, and $\frac{4pbx^2}{3} + \frac{2pbx^3}{3a}$ that of a cone, whoſe baſe is the circle deſcribed by FG and altitude AF; but theſe are manifeſtly in the proportion of $3a+x$ to $2a+x$, or of 3AC+AF to 2AC+AF.

Hyperbolicum *Acutum*, is a ſolid made by the revolution of the infinite area of the ſpace contained between the curve and the aſymptote, in the Appollonian hyperbola, turning round that aſymptote. This produces a ſolid, or body, infinitely long; and yet, as Torricellius plainly demonſtrates (who gave it this name) it is equal to a finite magnitude.

Hyperbolic *Spindle*. See *Hyperbolic* Spindle.

HYPERBOLIFORM *Figures*, are ſuch curves as approach, in their properties, to the nature of the hyperbola, called alſo hyperboloides.

HYPERCATALECTIC, in the Greek and Latin poetry, is applied to a verſe, which has one or two ſyllables too much, or beyond the regular and juſt meaſure: as,

Muſæ ſorores ſunt Minervæ. Alſo,
Muſæ ſorores Palladis lugent.

The Greek and Latin verſes are diſtinguiſhed, with reſpect to their meaſure, into four kinds, acatalectic, catalectic, brachycatalectic, and hypercatalectic. See Acatalectic, &c.

The hypercatalectic is alſo called the hypermeter.

HYPERDULIA, in the church of Rome, a ſpecies of worſhip paid to the Holy Virgin; being greater than the dulia, or worſhip paid to the ſaints, but leſs than the latria, or ſupreme worſhip paid to the Deity. See Adoration and Worship.

HYPERICUM, St. John's-wort, in botany, a genus of plants, the flower of which conſiſts of five oblong, obtuſe, ſpreading petals: the ſtamina are compoſed of a great number of capillary filaments, coaleſcing at their baſe in three or five diſtinct bodies, and topped with ſmall antheræ: the fruit is a roundiſh capſule, with two, three, or five cells, containing a great number of ſmall ſeeds.

The common St. John's-wort, which grows in many parts of England, has a woody perennial fibrous root; from which ariſes ſeveral round ſtalks dividing into many branches; theſe are furniſhed at each joint with two ſmall oblong leaves placed oppoſite, without pedicles: the flowers grow on the extremities of the branches in numbers together, of a bright yellow colour, and come out in June.

The leaves and flowers of this ſpecies are uſed in medicine, and have been recommended of peculiar efficacy, in hyſterical, hypochondriacal, and melancholic diſorders, and alienations of mind; from its ſuppoſed virtue in which caſes, it received the name of *fuga dæmonum.* It promiſes to be of ſome uſe as a mild detergent and corroborant, diſcovering to the ſenſes a reſinous, bitteriſh, balſamic impregnation.

HYPERMETER, in the ancient poetry, the ſame with hypercatalectic. See the article Hypercatalectic.

HYPERSARCOSIS, in medicine and ſurgery, an exceſs of fleſh, or rather a fleſhy excreſcence, ſuch as thoſe generally ariſing upon the lips of wounds, &c. See Wound and Excrescence.

HYPERTHYRON, in the ancient architecture, a ſort of table uſed after the manner of a frieze, over the jaumbs of Doric doors and gates, and the lentils of windows. It lies immediately under the corona, and our workmen uſually call it the king-piece.

HYPHEN, an accent, or character, in grammar, implying that two words are to be joined, or connected into one compound word, and marked thus -, as pre-eſtabliſhed, five-leaved, &c.

Hyphens alſo ſerve to connect the ſyllables of ſuch words as are divided by the end of the line.

HYPNOTIC, in the materia medica, ſuch medicines as any way produce ſleep, whether called narcotics, hypnotics, opiates, or ſoporifics.

Authors are of various opinions in regard to the manner wherein hypnotics operate. See the article Narcotics.

HYPNUM, in botany, a genus of moſſes conſiſting of ſtalks and leaves, and producing membranaceous capſules; theſe capſules ſtand on pedicles, which grow on the alæ of the leaves, and have at their baſe a kind of ſquamous covering, formed of a matter quite different from the leaves of the plant; the ſquamous involucrum at the baſe of the pedicle, is called by Dillenius *perichætium*, and is the greater characteriſtic of the hypna, no moſſes of any other genus having it in this form.

HYPOCAUSTUM, among the Greeks and Romans, a ſubterraneous place, wherein was a furnace, to heat the baths. See Baths.

Another kind of hypocauſtum was a kind of kiln, to heat their winter parlours.

Among the moderns, it is that place where the fire is kept, that warms a ſtove or hot-houſe.

HYPOCHOERIS, in botany, a genus of plants whoſe flowers are compound, imbricated, and uniform, each conſiſting of numerous hermaphrodite corollulæ, that are all equal: the partial flower is monopetalous, ligulated, linear, truncated, and divided into five ſegments; there is no pericarpium; the cup is connivent and globoſo-acuminated; the ſeed is ſingle, oblong, and ending in a ſubulated pedicle, covered with down.

HYPOCHONDRIA, in anatomy, that part of the body on both ſides, which lies under the ſpurious ribs, and is extended to the ilia; comprehending not only the muſcles, but the internal viſcera.

HYPOCHONDRIAC *Affection*, *Paſſion*, or *Diſeaſe*, *Morbus Hypochondriacus*, vulgarly called the ſpleen, vapours, &c. in medicine, a diſorder that principally exerts its tyranny under the enſiform cartillage and ſpurious ribs, in the region of the hypochondria.

HYPOCISTIS, in pharmacy, an inſpiſſated juice, much reſembling the true Egyptian acacia. We meet with it in moderately large flat maſſes. It is conſiderably hard and heavy, of a fine ſhining black colour, like that of liquorice juice, when freſh broken, and of a duſkier black on the ſurface. It is brought to us from the Levant, and from ſome parts of Europe. The French make a good deal of it from the plants of their own growth, and ſometimes ſupply other places with it.

Hypociſtis is an aſtringent, and that of conſiderable power; it is good againſt diarrhœas and hæmorrhages of all kinds, and may be uſed in repellent gargariſms in the manner of the acacia; but is very rarely met with genuine in our ſhops; the German acacia being uſually ſold under its name.

HYPOGASTRIC, an appellation given to the internal branch of the iliac artery. See the articles Artery and Iliac.

Hypogastric Veins, ariſe on each ſide from the iliacs, and ſend out branches to the rectum. See the article Vein.

HYPOGASTRIUM, in anatomy, the lower part of the abdomen. See Abdomen.

HYPOMOCHLION, in mechanics, the ſame with fulcrum. See Fulcrum.

HYPOPYON, in medicine, a collection of purulent matter, immediately under the cornea, near the aqueous humour.

HYPORCHEMA, in the Greek poetry, a poem, conſiſting of divers kinds of verſe, and of different lengths; but always full of ſhort, or pyrrhichic feet.

HYPOSTATIS, among divines, ſignifies a perſon, or ſubſtance; chiefly uſed in ſpeaking of the perſons of the Trinity. See the article Trinity.

Hypostasis, in medicine, denotes the ſediment of urine.

HYPOTHECA, in the civil law, the ſame with mortgage in the common law. See the article Mortgage.

HYPOTHENAR, in anatomy, the abductor muſcle of the little finger. See the article Abductor.

HYPOTHENUSE, or Hypotenuse, in geometry, the longeſt ſide of a right-angled triangle, which ſubtends the right-angle. Thus, in the right-angled triangle ABC (plate LXIII. *fig.* 14.) AC is the hypothenuſe.

The word is Greek, and derived from *υϖο*, under, and *τεινω*, to extend.

The 47th prop. of Euclid's firſt book demonſtrates, that in every rectilinear right-angled triangle, the ſquare of the hypothenuſe is equal to the ſquares of both the other ſides. It is particularly called the Pythagorean problem, from its invention by Pythagoras, who is ſaid to have ſacrificed a whole hecatomb to the muſes, in gratitude for their aſſiſting him in the diſcovery.

HYPOTHESIS, in logic, a propoſition, or principle, which is taken for granted, in order to draw concluſions therefrom, for the proof of ſome point in queſtion.

The word is Greek, and compounded of *υϖω*, under, and *ϑεσις*, a theſis, or poſition, which is derived from *τιθημι*, to place, or put.

Hypothesis, in phyſics, &c. an imaginary ſyſtem laid down to account for ſome phænomenon of nature.

Whatever is not derived from phænomena, ſays

Sir Iſaac Newton, is an hypotheſis; and no hypotheſes of any kind are to be admitted in experimental philoſophy.

Hypothesis, in aſtronomy, is more particularly applied to the ſeveral ſyſtems of the heavens, as different aſtronomers have ſuppoſed the arrangement and motion of the heavenly bodies. The principal of theſe are the Ptolemaic, Copernican, and Tychonic ſyſtems.

HYPOTRACHELION, in architecture, denotes a little frieze in the Tuſcan and Doric capitals, between the aſtragal and annulets, called likewiſe colerin, gorgerin, &c. By ſome it is applied to the neck of any column, or that part of the capital below the aſtragal.

HYPOTYPOSIS, in rhetoric, ſignifies a lively deſcription.

HYPOZOMA, in anatomy, a membrane that ſeparates two cavities: ſuch is the diaphragm.

HYPSILOIDES, in anatomy, the ſame with os hyoides. See the article Hyoides.

HYSSOP, *Hyſſopus*, in botany, a genus of plants, the flower of which is monopetalous and ringent, with a narrow cylindrical tube; the upper lip erect, roundiſh, and emarginated; the lower one divided into three ſhort ſegments, the middle one of which is hollow and cordated: it hath no pericarpium; but the ſeeds, which are oval and four in number, are placed in the bottom of the cup.

The common hyſſop hath brittle branchy ſtalks, which are furniſhed with ſmall lanceolated leaves, placed oppoſite, in pairs, of a darkiſh green colour. The flowers come out in July and Auguſt, and are of a blue colour, growing in ſpikes: the whole plant is perennial, and cultivated in gardens.

Hyſſop has an acrid taſte, and a ſtrong aromatic ſmell; it ſtrengthens the ſtomach, helps digeſtion, and, by its power of attenuating the viſcous matter from the lungs, promotes expectoration, and is therefore good in moiſt aſthmas. Its good effects in the ſtomach are of the ſame kind, depending on its attenuating and abſterging the viſcous phlegm lodged there, which impedes the diſcharge of its proper function. It is alſo good in diſeaſes of the head. It is beſt taken in infuſion, in the manner of tea, not made ſo ſtrong as to be diſagreeable to the palate, and often repeated. It is one of thoſe few ſimples, of which there is a diſtilled water made that is good for any thing; there comes over with it ſo much of a warm eſſential oil, as not only prevents it from mothering and ſtinking, which moſt ſimple waters are ſubject to, but alſo makes it a good pectoral, and efficacious to all thoſe purpoſes which the herb is given for in any other form.

Externally, hyſſop is greatly recommended in bruiſes; the blackneſs ſettling under the eyes from blows, is carried off very readily by a cataplaſm of the leaves, or only a little bundle of them ſewed up in a linen rag, and applied to the part: and Ray gives us an account from Mr. Boyle, of a violent contuſion of the thigh, from the kick of a horſe, very happily cured by this herb, boiled as a cataplaſm; he tells us, the violent pain was almoſt inſtantly removed, and the very mark and blackneſs taken off in a few hours.

HYSTERICAL *Diſeaſe*, Hysteric *Affection*, or *Paſſion*, in medicine, a diſeaſe in women, likewiſe called a ſuffocation of the uterus, or fits of the mother.

There is no diſeaſe ſo vexatious to women as that called hyſterical; and although it may not be attended with any great danger, yet it is frequently very terrifying: and it alſo ſometimes deprives them of their ſenſes as effectually, as if they had been ſeized with an epileptic fit.

When a woman has fallen into an hyſterical fit, blood-letting will be of uſe, if ſhe has ſtrength to bear it; if not, cupping-glaſſes are to be applied to her groins or hips: but if ſhe continues long in it, put the ſnuff of a candle, or ſome other thing of a fœtid ſmell, to her noſtrils, in order to rouſe her. In the mean time, her thighs and legs ought to be rubbed.

When ſhe is recovered from the fit, proper means muſt be uſed to prevent a relapſe. If ſhe be liable to obſtructions, and not regular, the menſtrual diſcharges are to be promoted. The ſtrong-ſmelling gums and ſteel medicines are very ſerviceable, and it is very beneficial to uſe exerciſe. But the diſturbances of the mind generally require proper remedies. *Mead.*

HYSTERON Proteron, in grammar and rhetoric, a ſpecies of the hyperbaton, wherein the proper order of conſtruction is ſo inverted, as that the part of any ſentence which ſhould naturally come firſt is placed laſt, as in this of Terence, *Valet & vivit*, for *Vivit & valet*.

HYSTEROTOMIA, *υϛεροτομια*, in anatomy, an anatomical diſſection of the uterus or womb. See the article Uterus.

HYSTEROTOMOTOCY, *υϛεροτομοτοκια*, among chirurgical writers, the ſame with the Cæſarian ſection. See Cæsarian *Section*.

I.

I, Is the third vowel and ninth letter of the Engliſh alphabet: it is alſo a conſonant, and accordingly has two forms. When a conſonant, it is lengthened downwards, thus J, and pronounced not much unlike the ſoft G before *e*, as in *geſture*.

The letter I was derived from the old Hebrew Jod, and is ſounded by throwing the breath ſuddenly againſt the palate with a ſmall hollowing of the tongue, and the ſame opening of the lips and teeth nearly as in pronouncing A and E.

The Greeks had no J conſonant, and therefore made uſe of the I vowel inſtead of it, as ΙΗΣΟΥΣ. The Engliſh and French have two kinds of J conſonants; the firſt has a ſnuffling kind of ſound, and ſerves to modify that of the following vowels, as in *Jew*, *jolly*, &c, The latter is pronounced like the Hebrew *Jod*, which is ſounded as the conſonant *y*, as we find it ſtill among the Germans, &c. Of this we have ſome inſtances in words which are indifferently written with a *y* or *i* before a vowel, as *voiage*, *voyage*, &c.

J, in abbreviations and cyphers, ſtands for Jeſus.

I was uſed by the ancients as a numeral, denoting 100, according to this verſe:

I. c. *Compar erit*, *et centum ſignificabit*.

The Greek *Iota*, and the Hebrew *Jod*, ſtand but for ten.

JACENT, a term applied by Helmont to nature, when a diſeaſe is riſen to a head, and the morbific matter ſtrives to ſuppreſs the vital flame.

JACK, in mechanics, a portable machine for raiſing great weights.

In order to explain the operation of this machine, we have given perſpective views of its ſeveral parts on plate LXIII. *fig.* 15, 16, 17, 18, where *fig.* 15 is the whole machine; *fig.* 16, ſhews the rack, and the pinion which carries it; *fig.* 17, diſplays the whole machinery; and *fig.* 18, the rack, ſeparately. The ſame letters refer to the ſame parts in all the four figures.

A, is a ſtrong caſe of wood, firmly bound with iron.

B, the open part of the caſe in which the rack moves.

C, the bottom claw of the jack, intended for raiſing weights very near the ground.

D, the rack, ſeparated from the other parts of the machinery.

E, the upper claw, or fork, of the jack.

F, a pinion of four leaves, that moves the rack D.

G, the winch or crank of the handle.

H, a hook to prevent the weight, when raiſed to a ſufficient height, from falling down again, by putting the curved part of the hook round the handle.

I, a large wheel, with ſixteen teeth.

K, a pinion of four leaves, that moves the large wheel I.

The power of this machine is very eaſily calculated in the following manner:

Suppoſe the winch or crank G, to be four times as long as the radius of the pinion K, then will the power of the machine in this part be as 4 to 1. But the pinion K has only four leaves, and the wheel I ſixteen teeth; therefore the power of the machine in this part is alſo as 4 to 1. Conſequently, $4\times 4 = 16$, is the power of both theſe parts conjointly. And as the wheel I has ſixteen teeth, and the pinion T, that moves round the rack, only four leaves, the power of the machine in this part is alſo as 4 to one. Conſequently the whole power of the machine is as 64 to 1: for $4\times 4\times 4 = 64$. If therefore we ſuppoſe a man can work at the handle with a force of thirty pounds, he will be able to raiſe a weight of one thouſand nine hundred and twenty pounds, ſuppoſing the machine to have no friction.

Kitchen JACK, a compound engine, where the weight is the power applied to overcome the friction of the parts, and the weight with which the ſpit is charged; and a ſteady and uniform motion is obtained by means of the fly. See the article FLY.

Smoak JACK. See SMOAK-JACK.

JACK-DAW, in ornithology, a ſpecies of corvus, with a black and grey head, a browniſh black body, and the wings and tail black.

It is one of the ſmalleſt of the crow-kind, but an erect and well-ſhaped bird.

JACKALL, in zoology, an animal of the dog-kind, with a ſlender ſnout.

It is a very beautiful creature, and ſo like a dog, as to be miſtaken at firſt ſight for ſome mungrel breed of that animal.

Its ſize is that of a ſmall hound; and, in the Eaſt, where it is a native, there are vaſt packs of them, often more than two hundred in a company, which hunt animals they would never dare to attack ſingle. It is not impoſſible that lions and other beaſts of prey may be alarmed by the cries of theſe animals in their chace, and fall in and rob them of their prey; but the general opinion of their attendance on the lion, is fabulous.

JACOBINE, or JACK, in ornithology, a very ſmall ſort of pigeon, with a range of feathers inverted quite over the hinder part of the head; bearing ſome reſemblance to a friar's hood, whence the name.

JACOBINE MONKS, the ſame with the Dominicans. See DOMINICANS.

JACOBITES, a term of reproach beſtowed on the perſons, who, vindicating the doctrines of paſſive obedience and non-reſiſtance with reſpect to the arbitrary proceedings of princes, diſallow of the late Revolution, and aſſert the ſuppoſed rights, and adhere to the intereſts of the late abdicated king James and his family.

JACOBITES, in church-hiſtory, a ſect of Chriſtians in Syria and Meſopotamia; ſo called either from Jacob, a Syrian, who lived in the reign of the emperor Mauricius; or from one Jacob, a monk, who flouriſhed in the year 550.

JACOB's-STAFF, a mathematical inſtrument, otherwiſe called fore-ſtaff. See FORE-STAFF.

JADE-STONE, a name given to a hard greyiſh green ſpecies of jaſper, of which the Turks generally make the handles of the ſabres of great people. See the article JASPER.

JALAP, in botany, a plant with thick, fleſhy, raddiſh-like roots; jointed ſtalks and brances; acuminated ſomewhat oval leaves ſet in pairs; and elegant, numerous, monopetalous, funnel ſhaped flowers, purple, yellow, white, or diverſly variegated, ſtanding in double cups, of which the innermoſt incloſes the flower and the outer ſurrounds its baſis: each flower is followed by a wrinkled, roundiſh, pentagonal, umbilicated fruit, about the ſize of a pepper-corn, including a white kernel. It is perennial, a native of the Eaſt-Indies, and cultivated in our gardens. Whether the roots produced here are equivalent in virtue to thoſe which are brought from abroad, has not, Dr. Lewis obſerves, been yet experienced.

The officinal jalap roots come from the province of Xalapa in New Spain; in thin tranſverſe ſlices, ſolid, hard, weighty, of a dark greyiſh colour on the outſide or cortical part, internally of a dark greyiſh, with ſeveral black circular ſtriæ: the hardeſt, darkeſt coloured, and thoſe which have the moſt of theſe reſinous veins, are the beſt.

This root has ſcarcely any ſmell, and very little taſte upon the tongue: ſwallowed, it affects the throat with a ſlight kind of pungency and heat. Taken in doſes of a ſcruple or half a dram, it proves an effectual, and in general a ſafe purgative; very rarely occaſioning any ſevere gripes or nauſea, which too frequently accompany the other ſtrong cathartics. Some have prohibited the uſe of this cathartic to children; apparently on no very good foundation. Young children, from the laxity of their ſolids, and the ſoft lubricating quality of their food, generally bear theſe kinds of medicines better than adults; and adults of a ſpongy, lax, or weak habit, better than the rigid or robuſt. Few, if any, of the ſtrong reſinous purgatives are in either caſe more innocent than jalap.

JAMAICA-PEPPER, *Pimienta*, or *Pimenta*, in the materia medica. See PIMIENTA.

JAMAICA-WOOD, a name ſometimes given to brazil. See the article BRAZIL.

JAMB, or JAUMB, among carpenters, an appellation given to door-poſts, as alſo to the upright poſts at the ſides of window-frames; and among bricklayers, it denotes the upright ſides of chimnies, from the hearth to the mantle-tree.

IAMBIC VERSES, are verſes in the Greek and Latin poetry, which are ſo called, as they wholly, or, for the moſt part, conſiſt of an iambus or iambic foot.

IAMBUS, in ancient poetry, a ſimple foot, conſiſting of a ſhort and a long ſyllable, as *pios.* See FOOT.

JAMES, or *Knights of St.* JAMES, a military order in Spain, firſt inſtituted about the year 1170, by Ferdinand II. king of Leon and Galicia. The greateſt dignity belonging to this order is grand maſter, which has been united to the crown of Spain. The knights are obliged to make proof of their deſcent from families that have been noble for four generations, on both ſides: they muſt alſo make it appear that their ſaid anceſtors have neither been Jews, Saracens, nor heretics; nor have ever been called into queſtion by the inquiſition. The novices are obliged to ſerve ſix months in the gallеys, and to live a month in a monaſtery; they obſerve the rule of St. Auſtin, making no vows but of poverty, obedience, and conjugal fidelity.

St. JAMES's-DAY, a feſtival of the Chriſtian church, obſerved on the 25th of July, in memory of St. James the greater, ſon of Zebedee.

Epiſtle of St. JAMES, a canonical book of the

New Teſtament, being the firſt of the catholic or general epiſtles; which are ſo called, as not being written to one but to ſeveral Chriſtian churches.

JANIZARIES, an order of the Turkiſh infantry, reputed the grand ſignor's guards, and the main ſtrength of the Ottoman army.

JANSENISTS, in church-hiſtory, a ſect of the Roman-catholics in France, who follow the opinions of Janſenius, biſhop of Ypres, and doctor of divinity of the univerſities of Louvain and Douay, in relation to grace and predeſtination.

JANUARY, the firſt month in the year, according to the preſent computation. It was introduced by Numa into the calendar, and placed at the winter ſolſtice, where March was before, which Romulus had placed at the vernal equinox.

The word is derived from Janus, to whom the Romans, on the firſt of this month, offered ſolemn ſacrifices.

JAPAN EARTH, in the materia medica. See the article TERRA *Japonica*.

JAPANNING, the art of varniſhing and drawing figures on wood, in the ſame manner as is done by the natives of Japan in the Eaſt-Indies.

JASHER, a book mentioned in ſcripture, and ſaid by ſome to be loſt; but ſome of the moſt celebrated Hebrew doctors ſay they have found it; telling us, that it is the book of Geneſis, wherein are contained the acts of Abraham, Iſaac, Jacob, and the other patriarchs, who were, by way of excellence, called Jaſherim, the Juſt: but that man muſt be eaſily ſatisfied, who can acquieſce with this interpretation. Dr. Lightfoot thinks the book of Jaſher is the ſame with the book of the Wars of God; but there is little foundation for it. This book, according to Grotius, was a triumphal poem; but Joſephus ſeems to bid faireſt for the truth, who ſays, that by this book are to be underſtood certain records kept in ſome place on purpoſe, and afterwards in the temple, giving an account of what happened among the Hebrews from year to year, and particularly the prodigy of the ſun's ſtanding ſtill, and directions and laws about the uſe of the bow; that is, the ſetting up of archery, and maintaining military exerciſes. If it be enquired why the title given to theſe Hebrew annals was the book of Jaſher (that is, the upright) this may be given as a reaſon, Becauſe it was by all perſons reckoned as a very juſt and authentic account of all thoſe events and occurrences which it recorded: it was compoſed with great uprightneſs and truth; thence it went commonly by the name of Jaſher's book, or chronicle. It was not the work of any inſpired perſon, but was of the nature of common civil annals; and, conſequently, we cannot infer from hence, that any book properly belonging to the Holy Scripture, that is, that was written by the inſpiration of the Holy Ghoſt, is at this day miſſing.

JASMINUM, the jaſmine, or jeſſamine-tree, in botany, a genus of plants, the leaves of which are in many ſpecies pinnated; the cup of the flower conſiſts of one leaf, but is divided at the top into five ſegments; the flower conſiſts of one leaf, is funnel-ſhaped, and divided into five ſegments: the flowers are ſucceeded by berries, which ſplit in the middle, each ſide, for the moſt part, containing a ſeparate ſeed.

The common white jaſmine is eaſily propagated by laying down the tender branches in the ſpring, which, by the ſucceeding ſpring, will be rooted ſtrong enough to be tranſplanted. They may alſo be raiſed by cuttings, which ſhould be planted in autumn in a moiſt border, where they may have the morning ſun: but they muſt be ſcreened from the violence of the ſun in the heat of the day, and frequently watered in dry weather. The cuttings, thus managed, will many of them live, and have roots fit to be removed in the following ſpring: but this method is ſeldom practiſed, the layers always making the beſt plants.

The two ſtriped ſorts ſhould be planted in a warm ſituation, eſpecially the white ſtriped; for they are much more tender than the plain, and are very ſubject to be deſtroyed by great froſts, if they are expoſed thereto: it will therefore be proper to preſerve a plant of each kind in pots, which may be removed into the green-houſe in winter, leſt, by expoſing them to the cold, they ſhould be deſtroyed, and the variety loſt.

JASPER, in natural hiſtory, a genus of ſcrupi, of a complex irregular ſtructure, of great variety of colours, and emulating the appearance of the finer marbles, or ſemi-pellucid gems.

JATROPHA, caſada plant, in botany, a genus producing male and female flowers: the male is monopetalous, and ſaucer-ſhaped, with a very ſhort tube; and the limb divided into five ſegments. The female flower is pentapetalous and roſaceous, placed in the ſame umbel with the male. The fruit is a roundiſh trilocular capſule, containing three roundiſh ſeeds.

JAVELIN, *Haſta*, in antiquity, a ſort of ſpear, five feet and a half long; the ſhaft of which was of wood, with a ſteel point.

Every ſoldier, in the Roman armies, had ſeven of theſe, which were very light and ſlender.

JAUNDICE, in medicine, a diſeaſe ariſing from a vitiated ſtate of the blood and humours, by means of an excrementitious bile, from a fault of the bilious ducts, greatly injuring the functions of the whole body, and rendering the ſkin of a yellow or livid colour.

JAW, *Maxilla*, in anatomy. See the article MAXILLA.

IBERIS, in botany, a genus of plants whoſe flower conſiſts of four unequal petals, vertically oval, obtuſe, and patent, with ſix ſtamina.

The fruit is a little pod, erect, roundiſh, compreſſed

preſſed, ſurrounded by an acute bifid margin on the upperſide, and containing two cells, in each of which is incloſed an oval ſeed.

IBEX, in zoology, an animal of the goat-kind, with extremely long nodoſe horns, which bend backwards, and are of a blackiſh colour, and annulated on the ſurface. The body is of a dark duſky colour, and is leſs in proportion to the height than that of the common goat: it has a great reſemblance to the deer-kind; the legs are alſo perfectly, like thoſe of the deer, ſtraight, elegant, and ſlender. It is frequent in many parts of Europe, and, notwithſtanding its vaſt horns, runs and leaps with ſurpriſing force and agility.

IBIS, a bird which was very uſeful to the Egyptians for deſtroying ſerpents, locuſts, and caterpillars; and, on that account, had divine honours paid it.

It is all over black, and about the ſize of the curlew, with the head of a cormorant, and the long neck of a heron.

ICE, *Glacies*, in phyſiology, a ſolid, tranſparent, and brittle body, formed of ſome fluid, particularly water, by means of cold. See COLD, FROST, and FREEZING.

ICE-HOUSE, a building contrived to preſerve ice for the uſe of a family in the ſummer ſeaſon.

Ice-houſes are more generally uſed in warm countries, than with us, particularly in Italy, where the meaneſt perſon, who rents a houſe, has his vault or cellar for ice.

ICH DIEN, the motto of the prince of Wales's arms, ſignifying, in the High Dutch, *I ſerve.*

ICHNEUMON, in zoology, the name of an animal, of which there have been a multitude of idle and fabulous things aſſerted. It is a creature of the weaſel kind, with a longer and narrower body than a cat, and ſomething approaching both in ſhape and colour to the badger.

ICHNEUMON is alſo the name of a genus of flies, of the hymenoptera order, with a triple ſting at the anus.

ICHNOGRAPHY, in perſpective, the view of any thing cut off by a plane parallel to the horizon, juſt at the baſe of it.

Among painters it ſignifies a deſcription of images, or of ancient ſtatues of marble and copper, of buſts and ſemi-buſts, of paintings in freſco, Moſaic works, and ancient pieces of minature.

ICHNOGRAPHY, in architecture, a deſcription or draught of the platform or ground-work of a houſe, or other building. Or it is the geometrical plan or platform of an edifice or houſe, or the ground-work of an houſe or building, delineated upon paper, deſcribing the form of the ſeveral apartments, rooms, windows, chimnies, &c.

ICHNOGRAPHY, in fortification, denotes the plan or repreſentation of the length and breadth of a fortreſs, the diſtinct parts of which are marked out, either on the ground itſelf, or on paper.

ICHOGLANS, the grand ſignior's pages, ſerving the ſeraglio.

ICHOR properly ſignifies a thin watery humour, like ſerum; but is ſometimes alſo uſed for a thicker kind, flowing from ulcers, called likewiſe ſanies.

ICHTHYOCOLLA, vulgarly called iſinglaſs, a ſolid glutinous ſubſtance, prepared from a fiſh of the ſturgeon kind caught in the rivers of Ruſſia and Hungary.

ICHTHYOLOGY, ιχθυολογια, the ſcience of fiſhes, or that branch of zoology which treats of fiſhes. See the article FISH.

ICHTHYOLOGIST, an author who has written profeſſedly of fiſhes.

ICHTHYS, ιχθυς, in antiquity, a celebrated acroſtic of the Erythræan ſibyl; the firſt words of each verſe of which were, Χριϛος Θεȣ υιος σωτηρ, that is, *Jeſus Chriſtus Dei filius ſervator*; and the initial Greek letters form the word ιχθυς, whence the name.

ICONOCLASTS, εικονοκλαϛοι, in church hiſtory, an appellation given to thoſe perſons, who, in the eighth century, oppoſed image-worſhip; and is ſtill given by the church of Rome, to all Chriſtians who reject the uſe of images in religious matters. See IMAGE.

ICOSAHEDRON, a regular ſolid, terminated by twelve equilateral and equal triangles.

The word is Greek, and compounded of εικοσι, twenty, and εδρα, a baſe.

It may be conſidered as conſiſting of twenty triangular pyramids, whoſe vertices meet in the center of a ſphere that circumſcribes them, and therefore have their heights and baſes equal; wherefore the ſolidity of one of theſe pyramids multiplied by twenty, the number of baſes, gives the ſolid content of the icoſahedron.

ICOSANDRIA, the name of the twelfth claſs in the Linnæan ſyſtem of botany, comprending thoſe plants whoſe flowers are hermaphrodite. The calyx monophyllous and concave, with the corolla faſtened by its claws to the inner ſide of the cup; and containing twenty or more ſtamina affixed to the cup. The principle characteriſtic of this claſs is rather to be taken from the manner of inſertion; for though the number of ſtamina are rarely leſs than twenty, yet in ſome ſpecies they frequently exceed it.

To this claſs belong the torch-thiſtle, almond, plumb, pear, ſtrawberry, myrtle, with ſeveral other genera.

ICTERIC DISEASE, the ſame with the jaundice. See JAUNDICE.

IDEA, the repreſentation or reſemblance of ſomething, even though not ſeen, as conceived by the mind.

As to the origin of ideas, the Peripatetics maintain that external objects emit ſpecies entirely reſembling them, and that theſe ſpecies ſtriking on our ſenſes are by them tranſmitted to the underſtanding; that being material, they are rendered intelligible by the active intellect, and are at length received by the paſſive.

Others think that our ſouls have of themſelves the power of producing ideas of things we would think upon, and that they are excited to this by the impreſſions which objects make our ſenſes, though theſe impreſſions are not images of any thing reſembling the objects that occaſioned them.

Others maintain that the mind, by conſidering itſelf and its own perfections, can diſcover all things that are without. Others, with Des Cartes, hold that our ideas are innate or born along with us.

Malebranche and his followers maintain that God has in himſelf the ideas of all the beings he has created, and thus he ſees all things in conſidering his own perfections to which they correſpond; and that, as he is intimately united to our ſouls by his preſence, our minds perceive things in him which repreſent created beings; and that thus we come by all our ideas: and yet, ſays he, though we ſee all ſenſible things in God, we have not our ſenſations in him: for in our perception of any ſenſible object is included both a ſenſation and a pure idea. The ſenſation is a mortification of the ſoul, and it is God who cauſes it in us; but the idea joined with the ſenſation is in God, and it is in him we ſee it.

The Carteſians diſtinguiſh three kinds of ideas; the firſt innate; ſuch as we have of God, as a being infinitely perfect: ſecondly, adventitious, which the mind receives in proportion as objects preſent themſelves to our ſenſes: thirdly, factitious, thoſe which the mind forms by aſſembling and combining the ideas it already had, and theſe are called complex. But Mr. Locke has made it appear that all our ideas are owing to our ſenſes, and the reflection of our minds upon thoſe ideas which the ſenſes have at firſt furniſhed us with; and that the diſtinction of the Carteſians is mere chimera. See *Locke's Eſſay on the Human Underſtanding.*

IDENTITATE Nominis, in law, a writ that lies where a perſon is impriſoned inſtead of another of the ſame name, commanding the ſheriff to enquire whether the priſoner be the perſon againſt whom the action was brought, or not; and if not, to diſcharge him.

IDENTITY, or Sameness, denotes that by which a thing is itſelf, and not any thing elſe; in which ſenſe, identity differs from ſimilitude as well as diverſity.

IDES, *Idus*, in the Roman calendar; eight days in each month are ſo denominated, commencing in the months of March, May, July, and October, on the fifteenth day, and in the other months on the thirteenth, and reckoned backward, ſo as in the four months above ſpecified to terminate on the eighth day, and in the reſt on the ſixth.

The word is variouſly derived; it ſeems moſt probably to be formed of the Etrurian word *iduo*, for *divido*, to divide; becauſe the ides divided the month into two equal parts.

The ides came between the calends and nones. The fourteenth day of March, May, July, and October, and the twelfth of the other eight months, was *pridie idus*, or the eve of the ides: the thirteenth in the four months, and the eleventh in the other eight, was called 3 idus, or the third of the ides of ſuch months: and ſo on to the eighth and ſixth days, which made the eighth of the ides, 8 idus.

The method of reckoning is ſtill retained in the Roman chancery, and calendar of the breviary.

The ides of May were conſecrated to Mercury; thoſe of March were eſteemed unhappy after Cæſar's murder on that day: the time after the ides of June was reckoned fortunate for thoſe who entered into matrimony; the ides of Auguſt were conſecrated to Diana, and obſerved as a feaſt day by the ſlaves. On the ides of September auguries were taken for appointing the magiſtrates, who formerly entered upon their offices on the ides of May, afterwards on thoſe of March.

IDIUM, *Idioma*, either the peculiarities of a language, or the particular dialect of ſome province, differing in ſome reſpects from the language of the nation in general, from which it is derived.

The word is Greek, ιδιωμα, ſignifying the ſame thing, and derived from ιδιος, proper, or one's own.

IDIOPATHY, in phyſic, a diſorder peculiar to a certain part of the body, and not ariſing from any preceding diſeaſe; in which ſenſe it is oppoſed to ſympathetic. Thus, an epilepſy is idopathic, when it happens merely through ſome fault in the brain; and ſympathetic, when it is the conſequence of ſome other diſorder.

IDIOSYNCRASY, among phyſicians, denotes a peculiar temperament of body, whereby it is rendered more liable to certain diſorders, than perſons of a different conſtitution uſually are. See the article Temperament.

IDIOT, in the Engliſh laws, denotes a natural or fool from his birth.

A perſon who has underſtanding enough to meaſure a yard of cloth, number twenty righty, and tell the days of the week, &c. is not an idiot in the eye of the law.

In other countries, repeating the Lord's prayer ſaves a man from being reckoned an idiot.

IDOLATRY, the adoration paid to idols and falſe gods, which is due to God alone.

IDYLLION, ειδυλιον, in ancient poetry, is only a diminitive of the word ειδος, and properly ſignifies any poem of moderate extent, without conſidering the ſubject. But as the collection of Theocritus's poems were called Idyllia, and the paſtoral pieces being by far the beſt in that collection, the term idyllion ſeems to be now appropriated to paſtoral pieces. See the article PASTORAL POETRY.

So very different are our modern idyllions from thoſe of the ancients, by introducing none but allegorical ſhepherds, that a literal tranſlation of Theocritus's idyllions, however well executed, would be reliſhed only by people of taſte, and thoſe too well acquainted with the ſimplicity and manners of the ancients.

JEALOUSY, in general, denotes the fear of a rival; but is more eſpecially underſtood of the ſuſpicion which married people entertain of each other's fidelity and affection.

Bitter Waters of JEALOUSY, in Jewiſh antiquity, certain conſecrated waters, which a woman was obliged to drink, in order to clear herſelf of the crime of adultery, whereof her jealous huſband accuſed her; the conſequence of which draught was, that if innocent ſhe ſuffered no harm, but if guilty her belly ſwelled, &c.

JEARS, in the marine, a certain double tackle, or complication of pullies, whereby to raiſe the principal ſail-yards of a ſhip, particularly thoſe of the main, fore, and mizzen-ſails.

JECUR, the liver, in anatomy. See the article LIVER.

JEHOVAH, one of the Scripture names of God, ſignifying the Being who is ſelf-exiſtent, and gives exiſtence to others. See the article GOD.

JEJUNUM, in anatomy, the ſecond of the ſmall guts, ſo called becauſe it is generally found empty. This is owing to the fluidity of the chyle, the greater ſtimulus of the bile in it, and the abundance of the lacteal veſſels with which it is furniſhed. Its ſituation is in the region above the navel; it has a great many connivent glands. Its beginning is where the duodenum ends; and it terminates where theſe valves are obliterated. Its length is different in various ſubjects; but is uſually between thirteen and ſixteen ſpans.

JEOFAILE, or JEOFAYLE, in law, a term uſed for an overſight in pleading, or other proceedings in law.

JERUSALEM-ARTICHOKE. See the article HELIANTHUS.

JESUITS, or the ſociety of Jeſus, a moſt famous religious order in the Romiſh church, founded by Ignatius Loyola, a native of Guipuſcoa in Spain, who in the year 1538, aſſembled ten of his companions at Rome, principally choſen out of the univerſity of Paris, and made a propoſal to them to form a new order; when, after many deliberations, it was agreed to add to the three ordinary vows of chaſtity, poverty, and obedience, a fourth, which was, to go into all countries whither the pope ſhould pleaſe to ſend them, in order to make converts to the Romiſh church. Two years after, pope Paul III. gave them a bull, by which he approved of this new order, giving them a power to make ſuch ſtatutes as they ſhould judge convenient; on which, Ignatius was created general of the order; which in a ſhort time ſpread over all the countries of the world, to which Ignatius ſent his companions, while he ſtaid at Rome, from whence he governed the whole ſociety.

The entire ſociety is compoſed of four ſorts of members; novices, ſcholars, ſpiritual and temporal coadjutors, and profeſſed members. The novices continue ſo two years, after which they are admitted to make the three ſimple vows, of chaſtity, poverty, and obedience, in the preſence of their ſuperiors: the ſcholars add ſome ſpiritual exerciſes to their ſtudies. The principal coadjutors aſſiſt the profeſſed members, and alſo make the three ſimple vows: the temporal coadjutors, or lay-brothers, take care of the temporal affairs of the ſociety; and the profeſſed members, which compoſe the body of the ſociety, beſides the three ſimple vows, add a ſpecial vow of obedience to the head of the church in every thing relating to miſſions among idolaters and heretics. They have profeſſed houſes for their profeſſed members and coadjutors; colleges, in which the ſciences are taught to ſtrangers; and ſeminaries, in which the young jeſuits go through a courſe of philoſophy and theology. They are governed by a general, who has four aſſiſtants, and who appoints rectors, ſuperiors of houſes, provincials, viſitors, and commiſſaries. The diſcipline of theſe houſes, and eſpecially of the colleges, was regulated by Ignatius himſelf.

JET, *Gagates*, in natural hiſtory, a ſolid, dry, opake, inflammable ſubſtance, found in large detached maſſes, of a fine and regular ſtructure, having a grain like that of wood, ſplitting more eaſily horizontally than in any other direction, very light, moderately hard, not fuſible, but readily inflammable, and burning a long time with a fine greeniſh flame.

It is of a fine deep black colour, very gloſſy and ſhining, except upon its ſurface, where it has been fouled by accident. When examined by the microſcope, it is found to be compoſed of a number of parallel plates, very thin, and laid cloſely upon one another. It is not ſoluble in, nor makes any effervеſcence with acids. It ſhould be choſen of the deepeſt black, of a moderate hardneſs, very light, and ſuch as will ſplit moſt evenly in an horizontal direction; this being its great characteriſtic, by which it is diſtinguiſhed from the cannel-coal, which breaks eaſy any way.

Jet is of great uſe to perfumers, and is ſometimes preſcribed in medicine.

JET D'EAU, a French term, frequently alſo uſed with us for a fountain that caſts up water to a conſiderable height.

JETSON, Jetsen, or Jetsam, in law, is uſed for any thing thrown out of a ſhip or veſſel that is in danger of being a wreck, and which is driven by the waves on ſhore. See Flotson.

JEWEL, any precious ſtone or ornament beſet with them. See Diamond, Ruby, &c.

Jewel-Blocks, among ſailors, certain pullies hung to the outer-ends or yard-arms of the top-ſail yards: they are uſed to hoiſt the ſtudding-ſails by. See the article Studding-Sail.

Jewel-Office, an office belonging to the crown, that has the charge of faſhioning and weighing the king's plate, and delivering it out by warrants from the lord chamberlain.

The principal officer is the maſter of the jewel-office, who has a ſalary of four hundred and fifty pounds per annum.

JEWS, thoſe who profeſs obedience to the laws and religion of Moſes, before whom every man worſhipped God according to the inclination of his own heart.

How far the religious ceremonies of the Jews were copied from thoſe of the Egyptians, among whom they had ſo long ſojourned, or how far they were typical of ſomething future, are queſtions which we leave to be diſcuſſed by divines. But as to the religion of the modern Jews, it is a manifeſt abſurdity; ſince being without a temple, ſacrifices, &c. it cannot be conſidered as ſubſiſting any longer.

JEWISH Hours, in chronology. See the article Hour.

IGNIS Fatuus, in meteorology, a meteor, otherwiſe called, Will-with-a-wiſp. See the article Will-*With-a-Wiſp*.

Ignis Gehennæ, the ſame with the univerſal diſſolvent, or alkaheſt. See Alkahest.

Ignis Judicii, in our old cuſtoms, a purgation by fire. See Ordeal.

IGNITION, in chemiſtry, the heating metals red hot, without melting them. Lead and tin are too ſoft to bear ignition, which takes effect only in the harder metals, as gold and ſilver, but eſpecially iron.

IGNORAMUS, in law, a term ſignifying we are ignorant. This is uſed when the grand jury impannelled on the inquiſition of criminal cauſes, reject the evidence as too weak to make good the preſentment or indictment brought againſt a perſon, ſo as to bring him upon his trial by a petty jury; in which caſe they indorſe this word on the back of the bill of indictment. In conſequence of which, all further proceedings againſt the party accuſed are ſtopped, and the ſuppoſed offender is delivered without further anſwer.

IGNORANCE, *Ignorantia*, the privation or abſence of knowledge. See the article Knowledge.

Ignorance, in law, is a want of knowledge of the laws, which will not excuſe a perſon from ſuffering the penalty inflicted on the breach of them; for every one is obliged, at his peril, to know the laws of the land.

IGUANA, in zoology, an American ſpecies of lizard, with a long round tail, five toes on each foot, and the creſt of the throat and the dorſal ſuture dentated.

JIB, among ſeamen, the foremoſt ſail of a ſhip, or that which is extended the furtheſt before the prow: it is, like all the other ſtay-ſails, of a triangular form, and is hoiſted from the jib-boom towards the fore-top-maſt head.

Jib-Boom, a certain pole or ſloping maſt, which is run out on a line with the bowſprit, to bear out the jib to its proper extent: this boom can occaſionally be drawn in, which is always the caſe when they come into a harbour, to prevent breaking amongſt the ſhipping at anchor or paſſing.

ILEX, the holly tree, in botany. See the article Holly.

Ilex Coccigera, or holm oak, is of much lower ſtature than the former ſorts, and ſeldom grows to the height of a tree: this, though a native of the warmeſt parts of France, yet will endure the cold of our climate in the open air. It may be propagated in the ſame manner as the former, and deſerves a place among other ſhrubs of low growth for its curioſity, as being the plant on which the kermes are bred.

ILIAC Passion, called alſo *Volvulus*, *Miſerere Mei*, and *Chordapſus*, in phyſic, a ſevere kind of cholic.

This diſeaſe, by the Greeks, is a violent inflammation of the inteſtine, which, unleſs ſpeedy relief be given, ſoon terminates in a gangrene, and death.

Wherefore blood muſt be plentifully drawn with great expedition, not only once, but twice, and generally thrice: then the belly is to be moved; but this is very difficult to be done, becauſe acrid cathartics cauſe too great an irritation, and are thrown up by vomit: therefore it is to be attempted by ſtimulating clyſters, and gentle cathartics, which are moſt likely to give mutual aſſiſtance to each other's operations. Anodynes too are neceſſary, but mixed with the purging medicines. Thus a very proper medicine will be a ſcruple of the cathartic extract, with one grain of the Thebaic extract; and ſome hours after, two ſpoonfuls of infuſion of ſena, with the addition of a fourth part of the tincture of ſena, to be taken either every hour, or every two hours, till the patient has had a ſufficient number of ſtools.

If this courſe prove ineffectual, it will be right to order quickſilver to be ſwallowed down; which has a two fold uſe in this caſe; to wit, by its ponderoſity, that of reſtoring the natural motion of the inteſtines, which is inverted; and by its ſlipperineſs, that of ſoftening and driving downward the excrements which ſtop the paſſage. Upon theſe accounts it is to be given in large quantities, to a pound weight at leaſt; and generally requires to be repeated. Nor ought the phyſician to uſe any long delay in trying this experiment, for fear of an actual mortification of the inflamed parts, whereby the coats of the inteſtines are deſtroyed, and the quickſilver runs into the cavity of the abdomen.

In ſhort, fomentations are of ſome ſervice, particularly warm flannels ſoaked in ſpirits of wine; or what Sydenham preſcribes, a live puppy held conſtantly on the bare belly. But an immerſion up to the breaſt in the warm bath is far more beneficial; and if the pain is not diſcuſſed, it will be proper to apply cupping-glaſſes, with ſlight ſcarifications about the navel.

The ſame method of cure is to be obſerved in that ſevere diſeaſe, by the French called *colica pictonum*, and by the Engliſh in the American iſlands, where it is very rife, the dry belly-ach: for it is a pain attended with a fever and inflammation, and moſt troubleſome coſtiveneſs. *Mead.*

ILIACUS Musculus, in anatomy, a broad thick muſcle, lying on the inſide of the os ilium. It is fixed by fleſhy fibres to the internal labium of the creſt of the os ilium, to that of the ſlope between the two anterior ſpines, to the inſides of theſe ſpines, to the ſuperior half of the inſide of this bone, and to the adjacent lateral part of the os ſacrum. All theſe fibres, contracting by degrees, run obliquely towards the lower parts of the muſcular pſoas, uniting with it; and being fixed by a kind of aponeuroſis to the outſide of its tendon, all the way to the little trochanter.

ILIAD, ιλιας, in literary hiſtory, the name of an ancient epic poem, the firſt and fineſt of thoſe compoſed by Homer.

As there was no true hiſtory before the firſt Olympiad, it is reaſonable to ſuppoſe that Homer took the ſubject of his Iliad from thoſe traditional ſtories which were handed down from father to ſon, reſpecting the Trojan war; adding ſuch other characters, allegories, and circumſtances, as were ſuitable to his deſign, which was evidently that of diſplaying to his countrymen (who were Greeks) the miſchievous effects of their too frequent diſſentions, and the benefits ariſing from a contrary conduct.

It is to be obſerved, that at the time Homer wrote this poem, and for ſome centuries before, the Grecians were divided into as many ſmall independent ſtates as they had large cities: and as their body politic and government were diſtinct and different, ſo was too often their intereſt, whence aroſe animoſities and ſometimes wars among themſelves; yet as theſe people had very powerful neighbours, and inveterate enemies, they were often obliged, notwithſtanding their own petty quarrels, to conferate themſelves together under one general for their mutual ſafety; and when they were thus united, and had no contention among them, they were generally victorious, and an over-match even for the Perſians; but on the contrary, when by their own feuds and diſſentions, their armies were divided and weakened, their enemies prevailed over them, and part of their country was deſpoiled.

Homer ſaw this, and knowing that an inſtructive leſſon on the ſubject, diſguiſhed under the allegories of an important action, and delivered in an inſinuating pleaſing manner, would do more good with ſuch a people than the moſt powerful oratory and argumentation, he compoſed his iliad for their uſe; the deſign of which is to ſhew, that unanimity and concord among princes and governors occaſioned the preſervation and proſperity of ſtates, and that diſcord brought on their deſtruction. This, therefore, is the principal moral of the poem; and this he has exemplified in the anger of Achilles and its conſequences, which forms the action and fable of the poem, which is as follows:

Several Grecian princes, independent of each other, are united againſt the Trojans, to revenge themſelves of an inſult offered to Menelaus, king of Sparta. They elect Agamemnon, brother to the injured prince, their general, who by an act of violence affronts Achilles, the moſt valiant of all the confederates; upon which this prince breaks the union, withdraws from the army, and obſtinately refuſes to fight for the common cauſe; whereupon there are contentions among the troops, who grow mutinous, and the Trojans taking advantage of the abſence of Achilles, and of their diſputes and diviſions, recover new ſpirits, deſtroy a great number of the Greeks, and preſs them ſo cloſe, that they are obliged to raiſe fortifications to ſecure their fleet, are about to quit the Phrygian coaſt, and to return home with diſhonour. Agamemnon, by the advice of the other princes, ſolicits a reconciliation with Achilles, but in vain. He continues inexorable, and refuſes them aid, even at a time when all their beſt generals were wounded, their fortifications deſtroyed, and the fleet ſet on fire; at laſt, however, he permits his deareſt friend Patroclus to fight for the Greeks in his armour, who is killed by Hector; this draws the fury of Achilles on the Trojans, and Agamemnon and he having both ſeverely ſuffered for their folly, are made friends: Achilles returning again to the army, kills Hector with his own hand, and the Trojans are vanquiſhed: ſo that in this poem, which does not extend to the deſtruction of Troy, but ends with the death of Hector, becauſe that puts an end to the anger of Achilles, and the action is complete, the poet has fully inculcated his intended moral, by ſhewing the terrible effects which enſued from a diviſion among their princes, and the good effects which attended their union and friendſhip.

To excite curioſity, and raiſe our admiration to the higheſt pitch, he has inſerted many things that are wonderful, and out of nature; but they are generally introduced with the pomp of celeſtial machinery, and by favour of the gods and goddeſſes, in order that they may appear probable, and obtain belief. We are alſo to obſerve, that as valour was a darling paſſion among the Greeks, he has magnified their deeds, that they might read his works with the greater pleaſure, and that the moral might be more effectually fixed upon the mind.

Homer had ſuch a comprehenſive genius, ſuch a fertile fancy, and was ſo well acquainted with perſons and things, and eſpecially with the paſſions and humours of mankind, that the ancients eſteemed him as the great high-prieſt of nature, who was admitted into her inmoſt choir, and inſtructed in her moſt ſolemn myſteries. The characters of his perſons, though very numerous, are drawn with ſo much judgment, with ſuch a ſurpriſing variety, and ſo diſtinguiſhed by their manners and ſentiments, that every one has ſomething peculiar to himſelf, by which he is diſcovered even in his ſpeeches from all the reſt.

The diſtinctions he has obſerved in the different degrees of virtues and vices are extremely exact; and the ſingle quality of courage, which he has given to moſt of his heroes, is ſo wonderfully diverſified, that it appears different in each. Thus in a fine piece of painting, where ſome particular paſſion is repreſented, every face appears affected; but the attitude and turn of the features ſhew, that each is affected in a different manner, or in a different degree.

If we may credit Strabo the hiſtorian and geographer, Homer has been as exact in his deſcription of countries and cities, as in that of his perſons: but what more particularly recommends him to readers of taſte and genius, is his amazing imagination, his fertility of invention, which is indeed the very fountain of all poetry, and diſcovers itſelf in a miraculous manner, not only in his fable, allegories, machinery, and characters, but even in his deſcriptions, images, and ſimilies, which are even bold and animated. Every thing is alive in Homer. There is little of narration; for the perſons appear, as it were, before you, and ſpeak for themſelves. He has, as Ariſtotle obſerves, found out living words, and, by daring tropes and figures, conveys his ſentiments in an unuſual and ſurpriſing manner.

In him a weapon thirſts to drink the blood of an enemy; an arrow is impatient to be on the wing; his heroes are cloathed with courage and fortitude. Even his epithets diſcover his ſtrength of invention, and in many caſes anſwer the end of elaborate deſcriptions, eſpecially when compounded in his manner, as the Cloud-compelling Thunderer, the Far-darting Phœbus, &c. Nor is the force of his invention much leſs obvious in the ſtructure of his verſe, and the dignity and harmony of his numbers, which flow from Homer with ſo much eaſe, ſays Mr. Pope, that one would "imagine he had no other care than to tranſcribe as faſt as the muſes dictated; and at the ſame time with ſo much force and inſpiring vigour, that they awaken and raiſe us like the ſound of a trumpet. They roll along as a plentiful river, always in motion, and always full; while we are borne away by a tide of verſe, the moſt rapid, and yet the moſt ſmooth imaginable.

"Thus on whatever ſide we contemplate Homer, what principally ſtrikes us is his invention. It is that which forms the character of each part of his work; and accordingly we find it to have made his fable more extenſive and copious than any other, his manners more lively and ſtrongly marked, his ſpeeches more affecting and tranſported, his ſentiments more warm and ſublime, his images and deſcriptions more full and animated, his expreſſion more raiſed and daring, and his numbers more rapid and various.

"What he writes is of the moſt animated nature imaginable; every thing moves, every thing lives, and is put in action. If a council be called, or a battle fought, you are not coldly informed of what was ſaid or done as from a third perſon; the reader is hurried out of himſelf by the force of the poet's imagination, and turns in one place to a hearer, in another to a ſpectator. The courſe of his verſes reſembles that of the army he deſcribes. They pour along like a fire that ſweeps the whole earth before it. It is, however, remarkable, that his fancy, which is every where vigorous, is not diſcovered immediately at the beginning of his poem in its fulleſt ſplendor. It grows, in the progreſs, both upon himſelf and others, and becomes on fire like a chariot wheel, by its own rapidity. Exact diſpoſition, juſt thought, correct elocution, poliſhed numbers, may have been found in a thouſand; but this poetical fire, this *vivida vis animi*, in a very few. Even in works, where all thoſe are imperfect or neglected, this can overpower criticiſm, and makes us admire even while we diſapprove. Nay, where this appears, tho' attended with abſurdities, it brightens all the rubbiſh about it, till we ſee nothing but its own ſplendor. This fire is diſcerned in Virgil, but diſcerned as in a glaſs, reflected from Homer, more ſhining than fierce, but every where equal and conſtant. In Lucan and Statius, it burſts out in ſudden, ſhort, and interrupted flaſhes. In Milton, it glows like a furnace, kept up to an uncommon ardour by the force of art. In Shakeſpeare, it ſtrikes before we are aware, like an accidental fire from heaven: but in Homer, and in him only, it burns every where clearly, and every where irreſiſtably.

"This ſtrong and ruling faculty was like a powerful ſtar, which, in the violence of its courſe, drew all things within its vortex. It ſeemed not enough to have taken in the whole circle of arts, and the whole compaſs of nature; all the inward paſſions and affections of mankind, to ſupply his characters; and all the outward forms and images of things for his deſcriptions; but, wanting yet an ampler ſphere to expatiate in, he opened a new and boundleſs walk for his imagination, and created a world for himſelf in the invention of fable; for that which Ariſtotle calls the ſoul of poetry, was firſt breathed into it by Homer."

ILIUM, in anatomy, the third and laſt of the ſmall guts, is ſituated principally below the navel, near the oſſa ilii; whence its name. Its length is various: ſometimes not more than fifteen, ſometimes twenty ſpans or more. Its beginning is where the valves of the jejunum ceaſe to be conſpicuous, and its end is where the larger inteſtines begin; in which place it is, in a very ſingular manner, inſerted into the left ſide of the colon. It has no other valves except that great one at the end, which is called, by many, valvula coli Bauhini: its glands are, in general, more numerous towards the end than in any other part.

Ilium os. See Innominata ossa.

Illecebrum, in botany, a genus of plants, whoſe flower is apetalous; the cup is pentaphyllous and quinquangular, containing within it five capillary ſtamina. The fruit is an unilocular roundiſh capſule, acuminated on both ſides, including a large ſingle ſeed.

IMAGE, in a religious ſenſe, is an artificial repreſentation or ſimilitude of ſome perſon or thing, uſed either by way of decoration and ornament, or as an object of religious worſhip and veneration; in which laſt ſenſe, it is uſed indifferently with the word idol. See the article Idolatry.

IMAGINATION, a power or faculty of the mind, whereby it conceives and forms ideas of things communicated to it by the outward organs of ſenſe.

IMBECILITY, a languid, infirm ſtate of body; which, being greatly impaired, is not able to perform its uſual exerciſes and functions.

IMBIBING, the action of a dry porous body, that abſorbs or takes up a moiſt or fluid one: thus, ſugar imbibes water; a ſponge, the moiſture of the air, &c. See the articles Moisture, Hygrometer, &c.

IMBRICATED, among botaniſts, an appellation given to ſuch leaves of plants, as are placed over one another like the tiles of a houſe.

The term imbricated is likewiſe applied to ſome of the heart ſhells, from their being ridged tranſverſely in the ſame manner.

IMITATION, in literary matters, the act of doing or ſtriving to copy after, or become like to another perſon or thing.

Imitation, in muſic, a particular way of compoſition wherein each part is made to imitate the other, either throughout the whole piece, which is one of the kinds of canon; or only during ſome meaſures, which is a ſimple imitation.

Sometimes the motion or figure of the notes is only imitated, and that often by a contrary motion, which makes what they call a retrograde imitation.

IMMACULATE, ſomething without ſtain, chiefly applied to the conception of the holy virgin. See Conception.

IMMANENT, in logic. The ſchoolmen diſtinguiſh two kinds of actions, the one tranſient, which paſs from the agent to the patient; the other immanent, which continue in the agent. See Act.

IMMATERIAL, ſomething devoid of matter, or that is pure ſpirit: thus God, angels, and the human ſoul, are immaterial beings. See the articles God, Angel, and Soul.

IMMEDIATE, whatever is capable of producing an effect without the intervention of external means; thus we ſay, an immediate cauſe, in oppoſion to a mediate or remote one. See the article Cause.

IMMEMORIAL, in law, an epithet given to the time or duration of any thing, whoſe beginning we know nothing of.

IMMENSITY, an unlimited extenſion, or which no finite and determinate ſpace, repeated ever ſo often, can equal. See Infinity.

IMMERSION, that act by which any thing is plunged into water, or other fluid. See Fluid.

Immerſion, in aſtronomy, is when a ſtar or planet is ſo near the ſun with regard to our obſervations, that we cannot ſee it; being, as it were, enveloped and hid in the rays of that luminary. It alſo denotes the beginning of an eclipſe of the moon, or that moment when the moon begins to be darkened, and to enter into the ſhadow of the earth; and the ſame term is alſo uſed with regard to an eclipſe of the ſun, when the diſk of the moon begins to cover it. In this ſenſe emerſion ſtands oppoſed to immerſion, and ſignifies the moment wherein the moon begins to come out of the ſhadow of the earth, or the ſun begins to ſhew the parts of his diſk which were hid before. See the article Eclipse.

Immerſion is frequently applied to the ſatellites of Jupiter, and eſpecially to the firſt ſatellite; the obſervation whereof is of ſo much uſe for diſcovering the longitude. The immerſion of that ſatellite is the moment in which it appears to enter within the diſk of Jupiter, and its emerſion the moment when it appears to come out.

The immerſions are obſerved from the time of the conjunction of Jupiter with the ſun, to the time of his oppoſition; and the emerſions from the time of his oppoſiton to his conjunction.

The peculiar advantage of theſe obſervations is, that during eleven months of the year, they may be made at leaſt every other day. The perfection of this theory, and the praxis thereon, we owe to Mr. Caſſini.

IMMORTAL, that which will laſt to all eternity; as having in it no principle of alteration or corruption: thus God and the human ſoul are immortal. See the articles God and Soul.

IMMUNITY, a privilege or exemption from ſome office, duty, or impoſition; as an exemption from tolls, &c.

IMMUTABILITY, one of the divine attributes, founded on the abſolute perfection of the Deity. See God.

IMPALED, in heraldry; when the coat of a man and his wife who is not an heireſs are borne in the ſame eſcutcheon, they muſt be marſhalled in pale; the huſband's on the right ſide, and the wife's on the left: and this the heralds call baron and feme, two coats impaled.

If a man has had two wives, he may impale his coat in the middle between theirs; and if he has had more than two, they are to be marſhalled on each ſide of his in their proper order.

IMPALPABLE, that whoſe parts are ſo extremely minute that they cannot be diſtinguiſhed by the ſenſes, particularly by that of feeling.

IMPANELLING, in law, ſignifies the writing down, or entering into a parchment, liſt, or ſchedule, the names of a jury ſummoned by the ſheriff to appear for ſuch public ſervices as juries are employed in. See the article Pannel.

IMPARLANCE, in law, a petitition in court for a day to conſider, or adviſe, what anſwer the defendant ſhall make to the plaintiff's action; and is the continuance of the cauſe till another day, or a longer time given by the court.

IMPASSIBLE, that which is exempt from ſuffering, or cannot undergo pain or alteration.

IMPASTATION, in maſonry, a term uſed for a work made of ſtuc, or ſtone, beaten and wrought up in manner of a paſte.

IMPASTING, or Empasting, in painting. See Empasting.

IMPATIENS, in botany. See the article Balsamina.

IMPEACHMENT, an accuſation and proſecution for treaſon and other crimes and miſdemeanors.

Impeachment *of Waſte*, is a prohibition or reſtraint from committing of waſte upon lands or tenements.

IMPEDIMENTS, in law, are ſuch hindrances as put a ſtop, or ſtay, to a perſon's ſeeking for his right by due courſe of law.

IMPENETRABILITY, in philoſophy, that property of body, whereby it cannot be pierced by another: thus, a body, which ſo fills a ſpace as to exclude all others, is ſaid to be impenetrable. See the articles Body, Extension, &c.

IMPERATIVE, one of the moods of a verb, uſed when we would command, entreat, or adviſe: thus, *go*, *read*, *take pity*, *be adviſed*, are imperatives in our language; but in the learned languages, this mood has a peculiar termination to diſtinguiſh it from others, as *i*, or *ito*, *go*; *lege*, or *legito*, *read*, &c. and not only ſo, but the termination varies, according as you addreſs one or more perſons, as *audi* and *audite*; *ακȣέτω*, *ακȣέτων*, *ακȣέτωσαν*, &c.

IMPERATOR, in Roman antiquity, a title of honour conferred on victorious generals by their armies, and afterwards confirmed by the ſenate.

IMPERATORIA, maſter-wort, in botany, a plant whoſe leaves ariſe immediately from the root; the footſtalks are ſeven or eight inches long, dividing into three ſhort ones at the top, each ſuſtaining a tribbate leaf; the flower-ſtalks ariſe about two feet high, divided into two or three branches, which are terminated by umbels of white flowers whoſe petals are ſplit. The fruit is naked, round, and compreſſed, divided in two parts, and containing two oval furrowed ſeeds.

The root of this plant is fleſhy, aromatic, and has a ſtrong acrid taſte. It is reckoned cordial and ſudorific, and is an ingredient in many compoſitions.

IMPERFECT, ſomething that is defective, or that wants ſome of the properties found in other beings of the ſame kind: thus moſſes are called imperfect plants, becauſe almoſt all the parts of fructification are wanting in them; and for the like reaſon, is the appellation imperfect given to the fungi and ſubmarine plants.

Imperfect Flowers, thoſe otherwiſe called ſtamineous. See the article Stamineous.

Imperfect Numbers, ſuch whoſe aliquot parts taken together, do either exceed or fall ſhort of that whole number of which they are parts: they are abundant or deficient. See the articles Abundant and Deficient.

Imperfect Tense, in grammar, a tenſe that regards ſome preterite tenſe, or denotes the thing to be at that time preſent, and not quite finiſhed; as *ſcribebam*, *I was writing*.

IMPERIAL, ſomething belonging to an emperor or empire, as imperial crown, imperial chamber, imperial cities, imperial diet, &c.

IMPERSONAL Verb, in grammar, a verb to which the nominative of any certain perſon cannot be prefixed; or, as others define it, a verb deſtitute of the two firſt and primary perſons, as *decet*, *oportet*, &c. The imperſonal verbs of the active voice end in *t*, and thoſe of the paſſive in *tur*; they are conjugated through the third perſon ſingular of almoſt all the tenſes and moods: they want the imperative, inſtead of which we uſe the preſent of the ſubjunctive; as *pæniteat*, *pugnetur*; nor, but a few excepted, are they to be met with in the ſupines, participles, or gerunds.

IMPERVIOUS, a thing not to be pervaded, nor paſſed through, either by reaſon of the cloſeneſs of its pores, or the particular conſideration of its parts.

IMPETIGO, in medicine, a name by which the leproſy of the Greeks is ſometimes called. See Leprosy.

Impetigo is alſo a ſpecies of itch attended with dry ſcales or ſcurf, and an uneaſy pruriginous itching. See Itch.

IMPETUS, in mechanics, a force with which one body impels or ſtrikes another. See Momentum, Gunnery, &c.

IMPING, in falconry, the inſerting of a feather in the wing of an hawk, in the place of one that is broken.

IMPLEAD ſignifies to ſue or proſecute by due courſe of law.

IMPLEMENTS is uſed for all things neceſſary for a trade, or the furniture of an houſhold; in which ſenſe it is frequently uſed in wills, conveyances of moveables, &c.

IMPLICATION, in law, is where ſomething is implied that is not expreſſed by the parties themſelves in their deeds, contracts or agreements.

IMPORTATION, in commerce, the bringing merchandize into a kingdom from foreign countries; in contradiſtinction to exportation. See the article Exportation.

IMPOSITION *of Hands*, a religious ceremony, in which the biſhop lays his hands upon the head of a perſon, in ordination, confirmation, or in uttering a bleſſing. This practice is generally obſerved by the diſſenters at the ordination of their miniſters, when all the miniſters preſent place their hands upon the head of him whom they are ordaining, while one of the body prays for a bleſſing on him and his future labours.

IMPOSSIBLE, that which cannot be done or effected.

A propoſition is ſaid to be impoſſible, when it contains two ideas, which mutually deſtroy each other, and which can neither be conceived nor united together in the mind: thus, it is impoſſible that a circle ſhould become a ſquare, becauſe we conceive clearly that ſquareneſs and roundneſs deſtroy each other by the contrariety of their figure.

IMPOST, in law, ſignifies in general a tribute or cuſtom; but is more particularly applied to ſignify that tax which the crown receives for merchandizes imported into any port or haven. See Duty.

Some notwithſtanding, diſtinguiſh impoſts from cuſtoms, which laſt are rather the profits ariſing to the king from goods exported. See the article Customs.

Imposts, in architecture, the capitals of pillars, or pilaſters, which ſupport arches.

An impoſt, ſometimes called chaptrel, is a ſort of plinth, or little corniche, which crowns a pier, and ſupports the firſt ſtone whence an arch or vault commences. The impoſts are conformable to their proper orders. The Tuſcan has only a plinth; the Doric has two faces crowned; the Ionic, a larmier, or crown over the two faces, and its moulding may be carved; the Corinthian and Compoſite have a larmier, freeze, and other mouldings.

The projectures of the impoſts muſt not exceed the naked of the pilaſter: ſometimes the entablature of the order ſerves for the impoſt of the arch, and this has a very grand and ſtately appearance. The impoſt is a thing very eſſential to the compoſition of the ordonnances, inſomuch that without it, in the place where the curve-line of the arch meets with the perpendicular line of the pillar, there always ſeems a kind of elbow.

IMPOSTHUME, in ſurgery, &c. the ſame with abſceſs.

IMPOTENCE, or Impotency, in general, denotes want of ſtrength, power, or means to perform any thing.

IMPRACTICABLE Case, in algebra, that otherwiſe called irreducible. See Irreducible.

IMPRECATION, a curſe, or wiſh that evil may befal any one. See Execration.

IMPRESSION is applied to the ſpecies of objects, which are ſuppoſed to make ſome mark or impreſſion on the ſenſes, the mind, and the memory.

Impression alſo denotes the edition of a book, regarding the mechanical part only; whereas edition, beſides this, takes in the care of the editor, who corrected or augmented the copy, adding notes, &c. to render the work more uſeful. See Editor.

IMPRISONMENT, the ſtate of a perſon reſtrained of his liberty, and detained under the cuſtody of another.

IMPROPRIATION, a parſonage or eccleſiaſtical living, the profits of which are in the hands of a layman; in which ſenſe, it ſtands diſtinguiſhed from appropriation, which is where the profits of a benefice are in the hands of a biſhop, college, &c. though theſe terms are now often uſed promiſcuouſly. See the article Appropriation.

IMPUTATION, in general, the charging ſomething to the account of one, which belonged to another: thus, the aſſertors of original ſin maintain, that Adam's ſin is imputed to all his poſterity. See the article Original Sin.

In the ſame ſenſe, the righteouſneſs and merits of Chriſt are imputed to true believers. See the article Justification.

INACCESSIBLE, ſomething that cannot be come at, or approached, by reaſon of intervening obſtacles, as a river, rock, &c. It is chiefly uſed in ſpeaking of heights and diſtances. See Height and Distance.

INACTIVITY *of Matter.* See Inertia.

INADEQUATE Idea. See Idea.

INALIENABLE, that which cannot be legally alienated or made over to another: thus the dominions of the king, the revenues of the church, the eſtates of a minor, &c. are inalienable, otherwiſe than with a reſerve of the right of redemption.

INAMELLING, or Enamelling. See the article Enamelling.

INANIMATE, a body that has either loſt its ſoul, or that is not of a nature capable of having any.

INANITION, among phyſicians, denotes the ſtate of the ſtomach when empty, in oppoſition to repletion.

INARCHING, in gardening, is a method of grafting, commonly called grafting by approach. See Grafting *by approach.*

INAUGURATION, the coronation of an emperor or king, or the conſecration of a prelate: ſo called from the ceremonies uſed by the Romans, when they were received into the college of augurs. See Coronation, Consecration, &c.

INCAMERATION, a term uſed in the chancery of Rome, for the uniting of lands, revenues, or other rights, to the pope's domain.

INCANTATION, denotes certain ceremonies, accompanied with a formula of words, and ſuppoſed to be capable of raiſing devils, ſpirits, &c.

INCAPACITY, in the canon-law, is of two kinds: 1. The want of a diſpenſation for age in a minor, for legitimation in a baſtard, and the like: this renders the proviſion of a benefice void in its original. 2. Crimes and heineous offences, which annul proviſions at firſt valid.

INCARNATION, in theology, the act whereby the ſecond perſon of the Holy Trinity aſſumed the human nature, viz. a true body and reaſonable ſoul, in order to accompliſh the redemption of fallen mankind. See Trinity and Redemption.

INCARNATIVES, in ſurgery, medicines which aſſiſt nature in filling up wounds or ulcers with fleſh; or rather remove the obſtructions thereto. See the article Vulnerary.

Internal incarnatives are aliments which ſupply a balſamic chyle, and conſequently generate fleſh, and produce a full or plump habit.

INCARTATION, among chemiſts, the ſame with depart. See Depart.

INCENSE, or Frank Incense, in the materia medica. See the article Thus.

INCEPTIVE, a term uſed by Dr. Wallis to expreſs ſuch moments, or firſt principles, which, though of no magnitude themſelves, are notwithſtanding capable of producing it. Thus, a point is inceptive of a line, and a line inceptive of ſurface, &c.

INCEST, the crime of venereal commerce between perſons who are related in a degree wherein marriage is prohibited by the law of the country.

Incest Spiritual, a crime committed in like manner between perſons who have a ſpiritual alliance by means of baptiſm or confirmation.

INCH, a well known meaſure of length; being the twelfth part of a foot, and equal to three barley corns in length. See Foot and Measure.

Inch *of Candle*, or ſale by inch of candle. See the article Candle.

INCIDENCE, in mechanics and optics, denotes the direction on which one body ſtrikes on another. See Angle.

INCIDENT, in law, ſomething that inſeparably belongs to another: thus, a court baron is incident to a manor.

Incident, in poetry, denotes much the ſame with epiſode. See Episode.

INCISIVE, an appellation given to whatever cuts or divides: thus, the fore-teeth are called *dentes inciſivi*, or cutters; and medicines of an attenuating nature, incidents, or inciſive medicines. See the articles Teeth and Attenuants.

INCLE, a kind of tape made of linen-yarn.

INCLINATION is a word frequently uſed by mathematicians, and ſignifies the mutual approach, tendency, or leaning of two lines, or two planes, towards each other, ſo as to make an angle.

Inclination of a right-line to a plane, is the acute angle which that line makes with another right-line drawn in the plane through the point where the inclined line interſects it, and through the point where it is alſo cut by a perpendicular drawn from any point of the inclined plane.

Inclination of the axis of the earth, is the angle which it makes with the plane of the ecliptic, or the angle contained between the planes of the equator and ecliptic.

Inclination of a planet, is an arch of the circle of inclination, comprehended between the ecliptic and the plane of a planet in its orbit.

The greateſt inclination of Saturn, according to Kepler, is 2° 32′; of Jupiter, 1° 20′; of Mars, 1° 50′ 30″; of Venus, 3° 22′; of Mercury, 6° 54′. According to De la Hire, the greateſt inclination of Saturn is 2° 33′ 30″; of Jupiter, 1° 19′ 20″; of Mars, 1° 51′ 00″; of Venus, 3° 25′ 5″; of Mercury, 6° 52′ 00″.

Inclination *of a Plane*, in dialling, is the arch of a vertical circle, perpendicular both to the plane and the horizon, and intercepted between them.

INCLINED Plane, in mechanics, that which makes an oblique angle with the horizon.

That an inclined plane is a mechanical power ap-

Fig.1.

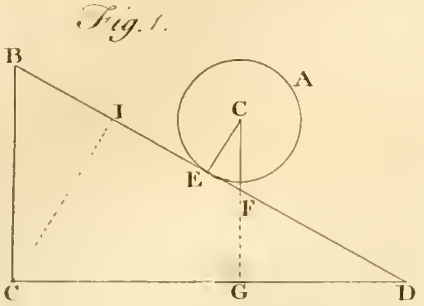


Fig.

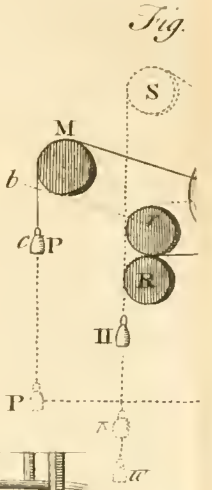


Fig.3. Turners Lathe and Wheel.

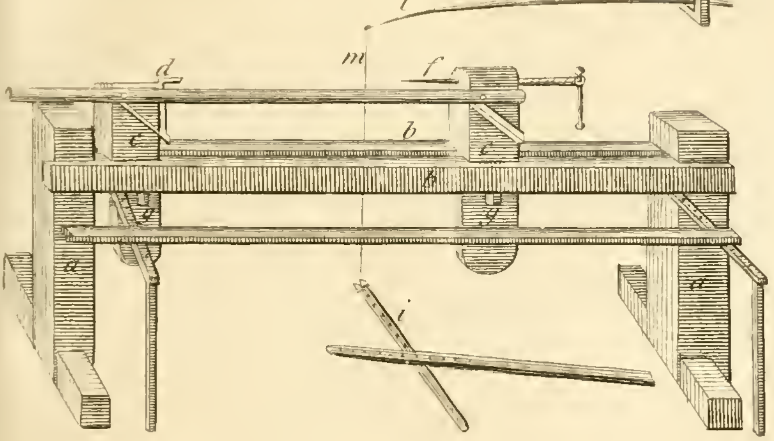


Fig.5. Brasiers Lathe.

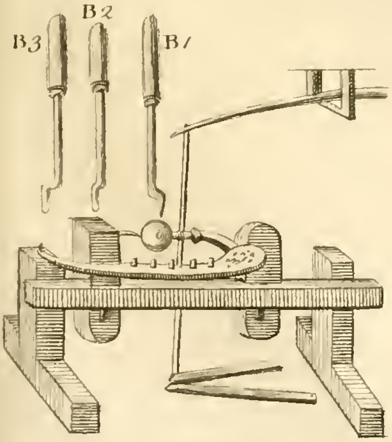
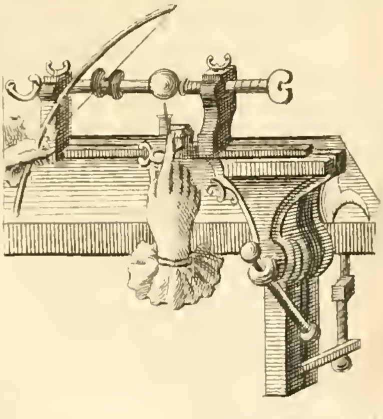


Fig.6. An Iron Lathe f
turning small Work in I



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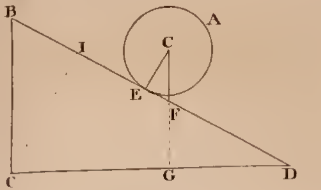


Fig. 2. Inclin'd Plane.

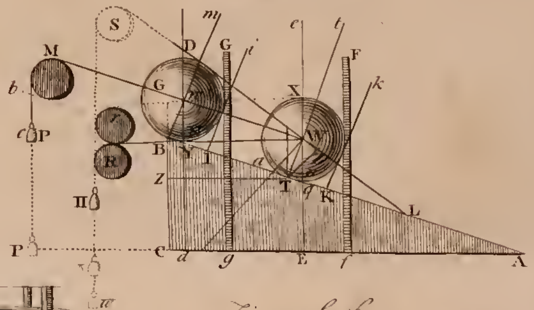


Fig. 3. Turners Lathe and Wheel.

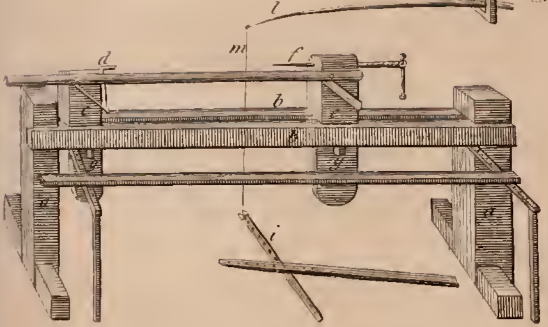


Fig. 4. Lathe.

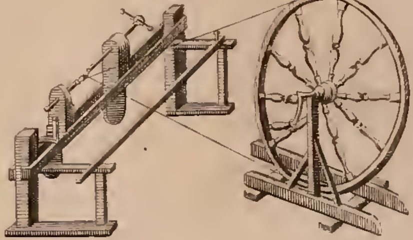


Fig. 7. Lathe for turning Oval and Rose Work.

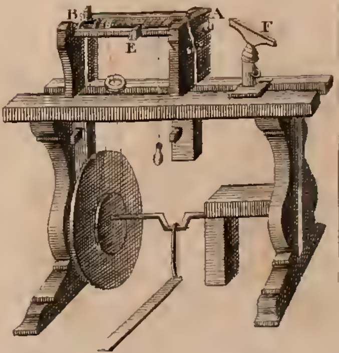


Fig. 5. Brasiers Lathe.

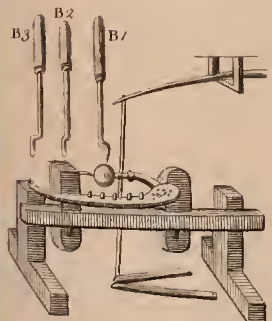
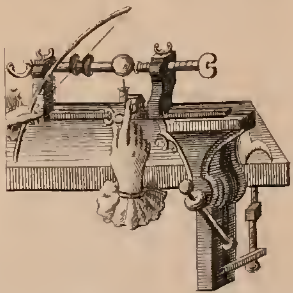


Fig. 6. An Iron Lathe for turning small Work in Metal.



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pears ſufficiently in its diminiſhing the weight of a body laid upon it, in regard to the power which holds it in æquilibrio. Let A (plate LXIV. *fig.* 1.) be a body ſuſtained on the inclined plane B D; from the center C draw C F perpendicular to the horizon or baſe D C, and C E perpendicular to the plane; then C F will repreſent the whole weight or force of gravity of the body A, which is reſolvable into the two forces C E and E F; but the force C E, being perpendicular to the plane, acts wholly upon it, and is equally re-acted on, or ſuſtained by, the plane; the other force E F, being parallel to the plane, is that by which the body deſcends, or is kept from deſcending by an equal power acting in a contrary direction. Therefore the whole weight of the body is to the power which keeps it in æquilibrio on the plane, as C F to F E, or (becauſe the triangles C F E and B D C are ſimilar) as B D to B C, that is, as the length of the plane to its height.

If it ſhould be required to lift up a very heavy body, as W or *w* (*fig.* 2.) the height C B, it would be impracticable to raiſe it up in the line C B without a power whoſe intenſity is equal to that of the weight; and even in that caſe very inconvenient to do it, eſpecially in building. But if an inclined plane A B be laid ariſing from the horizontal line A C, from whence the weight is to be raiſed, a leſs power than the weight will ſerve for that purpoſe, unleſs it puſhes the body directly againſt the plane (as in the direction W T) or draws the body away from the plane (as from W towards *e*, *t*, or L) or in any direction on that ſide of the line E *e*.

The direction in which the body can moſt eaſily be drawn or puſhed up the plane, is the line W*w* M, parallel to the plane, and paſſing through the center of the weight; for whether the power divides a plane *k* K (in a direction perpendicular to it) along the line W M, or the power P (by its deſcent to *p*) draws it in the ſame line, the velocity of the power will be equal to the line W*w*, the ſpace deſcribed by the center of gravity of the weight, whilſt the ſame weight riſes only the perpendicular height Z B (=*n*W) or has the ſaid line properly to expreſs its velocity. If the body was a cylinder, as a rolling-ſtone, and the plane T*t* were to paſs through the gudgeons or axis of the ſaid ſtone, it is evident that the caſe would be the ſame; and as the weight P has its rope running over the roller (or upper pulley) M, the line P*p* will be the velocity of the power. Therefore, in this caſe, the weight (if kept in æquilibrio) will be to the power, as W*w* (=TB) to *w*Y (=BZ) or as the hypothenuſe A B is to the perpendicular B C, which (by Eucl. 4, 6) are in the ſame proportion: and conſequently, if the power be never ſo little increaſed, it will draw the weight up the plane.

That the power acts with the greateſt advantage, whilſt it draws in the line of direction W*w* (parallel to the plane) is evident, becauſe if one end of the ſaid plane of direction remaining fixed at W, the other ſhould move towards B, or beyond it, then the body would be partly drawn againſt the plane, and therefore the power muſt be increaſed in proportion to the greateſt difficulty of traction: and if the end *w* of the line above-mentioned ſhould be carried to D, or beyond it, the power muſt be alſo increaſed, inaſmuch as it endeavours to lift the body off from the plane.

If the power draws in a line of direction W B (*fig.* 2.) parallel to the baſe of the plane, then, in order to keep the weight W in æquilibrio by the power Π, the ſaid power muſt be to the weight, as Z B to Z T, or as the perpendicular B C to the baſe A C of the triangle A C B. For if we ſuppoſe the pulley R at ſo great a diſtance from W, that the line of direction W R may not ſenſibly alter its horizontal poſition, whilſt the body W riſes the height B Z, in ſuch manner that Π ϖ (=W Y, and not W*w*) will be the velocity of the power. So that the velocity of the power to that of the weight will not be as the hypothenuſe to the perpendicular, as in the former caſe, but as the baſe to the perpendicular in the triangle A C B.

If the powers be increaſed juſt enough to overcome the friction of the plane and draw up the body W, let the pulley R be lifted up gradually to *r*, ſo as to keep the line W R parallel to itſelf till it comes to *w r*, and the power will be deſcended to π, when the weight is come to *w*B. But Π π together with the diſtance R*r*, is equal to Π ϖ, or W Y, &c. And this traction, being conſtantly made in the angle W B T, is the caſe.

INCLINERS, or INCLINING DIALS. See the article DIALLING.

INCLOSURE, in huſbandry, the fence or hedge made to incloſe lands. See the articles FENCE and HEDGE.

A very good incloſure may be made of elder-ſticks, or truncheons, cutten or twelve feet long, and ſtuck into the bank ſlopewiſe, ſo as to make a chequer-work. Theſe make the ſpeedieſt ſhelter of any; and when the trees are grown up, they are valuable for the turner's uſe. They ſucceed extremely well in watery places; and when planted on the banks of rivers, they prevent them from being undermined by the current.

The throwing down incloſures is an offence puniſhable by our ancient ſtatutes; yet if the lord of a manor incloſes part of the waſte, and does not leave ſufficient room for the commoners, they may break down ſuch incloſures, or have a writ of aſſize.

INCOGNITIO, or INCOG. is applied to a perſon that is in any place where he would not be known: but it is more particularly applied to princes or great men, who enter towns or walk the ſtreets without their ordinary train, or the uſual marks of their diſtinction and quality.

INCOMBUSTIBLE, ſomething that cannot be burnt or conſumed by fire.

INCOMMENSURABLE, a term in geometry, uſed where two lines when compared to each other, have no common meaſure, how ſmall ſoever, that will exactly meaſure them both. And, in general, two quantities are ſaid to be incommenſurable, when no third quantity can be found that is an aliquot part of both.

Such are the diagonal or ſide of a ſquare; for though each of thoſe lines have infinite aliquot parts, as the half, the third, &c. yet not any part of the one be it ever ſo little, can poſſibly meaſure the other, as is demonſtrated in prop. 17, lib. x. of Euclid.

Rappus, lib. iv. prop. 17, ſpeaks alſo of incommenſurable angles. As to ſurfaces which cannot be meaſured by a common ſurface, they are ſaid to be incommenſurable in power.

INCOMMENSURABLE NUMBERS are ſuch as have no common diviſor that will divide them both equally.

INCOMPATIBLE, that which cannot ſubſiſt with another without deſtroying it: thus cold and heat are incompatible in the ſame ſubject, the ſtrongeſt overcoming and expelling the weakeſt.

INCORPOREAL, a thing, or ſubſtance, which has no body; as God, angels, and the ſoul of man.

INCRASSATING, in pharmacy, &c. the rendering fluids thicker by the mixture of other ſubſtances leſs fluid, or by the evaporation of the thinner parts.

INCREMENT, and DECREMENT, the increaſe and decreaſe of a quantity. See the article SERIES.

INCRUSTATION, in ſurgery, the induction of a cruſt or eſchar upon any part.

Among maſons, incruſtation ſignifies the lining or coating of a wall, either with gloſſy ſtones, ruſtics, marble, pottery, or ſtucco-work, and that either equably or in panels and compartiments.

INCRUSTED, or INCRUSTATED COLUMN, is a column conſiſting of ſeveral pieces, or ſlips of ſome precious marble maſticated or cemented round a mould of brick, or other matter.

INCUBATION, the action of a hen, or other fowl, brooding on her eggs.

INCUBUS, or EPHIALTES, in phyſic, commonly called the night-mare, a diſorder under which the patient cannot ſtir himſelf, but with the utmoſt difficulty; is ſeized with a numbneſs and ſenſe of weight, with a dread of ſuffocation, and an oppreſſion, as from ſome body falling ſuddenly upon him.

The cure conſiſts in evacuations by phlebotomy and cathartics. The patient muſt be kept to a thin diet, and avoid all flatulent food.

INCUMBENT, a clerk, or miniſter, who is reſident on his benefice: he is called incumbent, becauſe he does, or at leaſt ought to bend his whole ſtudy to diſcharge the cure of his church.

INCURVATION *of the Rays of Light*, their bending out of a rectilinear or ſtraight courſe, occaſioned by refraction. See REFRACTION.

INCUS, in anatomy, a bone of the internal ear. See the article EAR.

INDEFEISIBLE, or INDEFEAZABLE, a term in law, for what cannot be defeated or made void; as an indefeiſible eſtate of inheritance, &c.

INDEFINITE, or INDETERMINATE, that which has no certain bounds, at leaſt aſſignable by the human mind.

Deſcartes uſes the word inſtead of infinite, in numbers and quantities, to ſignify a number ſo great, that an unit cannot be added to it; and a quantity ſo great, as not to be capable of any addition.

INDEFINITE, in the ſchools, alſo denotes a thing that has but one extreme; for inſtance, a line drawn from any point and extended infinitely; as alſo eternity *a parte ante*, or eternity *a parte poſt*.

INDEFINITE *Propoſition*. See the article PROPOSITION.

INDEFINITE, in grammar, implies ſuch nouns, pronouns, verbs, participles, &c. which are left in an uncertain indeterminate ſenſe, and not fixed to any particular time, or other circumſtance.

INDELIBLE, ſomething that cannot be cancelled or effaced.

INDEMNITY, in law, the ſaving harmleſs; or a writing to ſecure one from all damage and danger that may enſue from any act. An indemnity in regard to eſtates, is called a warranty. See the article WARRANTY.

Act of INDEMNITY, the ſame with act of grace. See *Act of* GRACE.

INDENTED, in heraldry, is when the out-line of an ordinary is notched like the teeth of a ſaw.

INDENTED *Line*, in fortification, the ſame with what the French engineers call redent; being a trench and parapet running out and in, like the teeth of a ſaw; and is much uſed in irregular fortification. See FORTIFICATION.

INDENTED *Leaf*, among botaniſts, is one whoſe margin ends in horizontal points that are of the conſiſtence of the leaf, and are ſeparated by intermediate ſpaces.

INDEPENDENTS, a ſect of proteſtants in England and Holland, ſo called from their independency on other churches, and their maintaining that each church or congregation has ſufficient power to act and perform every thing relating to religious government within itſelf, and is no way ſubject or accountable to other churches or their deputies.

The preſent independents differ from the preſbyterians only in their church government, in being generally more attached to the doctrines diſtinguiſhed by the term orthodoxy, &c. and in adminiſtering the Lord's ſupper at the cloſe of the afternoon's ſervice. See the article Presbyterians.

The ſeveral ſects of baptiſts are all independents with reſpect to church government.

INDETERMINATE, in general, an appellation given to whatever is not certain, fixed, and limited; in which ſenſe, it is the ſame with indefinite.

Indeterminate Problem, in algebra, one which is capable of an indefinite number of ſolutions.

INDEX, in anatomy, the ſame with the fore-finger. See Finger.

Index, in arithmetic and algebra, ſhews to what power any quantity is involved, and is otherwiſe called exponent. See Exponent.

Index *of a Logarithm*, that which ſhews of how many places the abſolute number belonging to a logarithm doth conſiſt; and of what nature it is, whether an integer or fraction. Thus, in this logarith 2.523421, the number 2 ſtanding on the left hand of the point is called the index, becauſe it ſhews that the abſolute number anſwering to the above logarithm, conſiſts of three places: for the number is always one more than the index.

If the abſolute number be a fraction, then the index of the logarithm hath a negative ſign, marked thus $\bar{2}.523421$. See the article Logarithm.

Index *of a Globe*, the little ſtyle or gnomon, which being fixed on the pole of the globe, and turning round with it, points out the hours upon the hour circle. See the article Globe.

Expurgatory Index, a catalogue of prohibited books in the church of Rome.

INDIAN-Shot, in botany. See the article Canna.

INDICATION, in phyſic, whatever ſerves to direct the phyſician how to act.

INDICATIVE, in grammar, the firſt mood, or manner, of conjugating a verb, by which we ſimply affirm, deny, or aſk ſomething; as *amant*, they love; *non amant*, they do not love; *amas tu*, doſt thou love?

Indicative *Column*. See Column.

INDICTION, in chronology, a cycle of fifteen years. See Cycle.

INDICTMENT, in law, is a bill or declaration of complaint, at the ſuit of the king, drawn up in form of law, and exhibited againſt a perſon, and afterwards preferred to the grand jury or inqueſt, who are to find whether the complaint be true or not. An indictment differs from an accuſation only in this, that the preferrer of the bill is not tied to the proof thereof, under any penalty, except there appear to be a conſpiracy.

INDIGESTION, *Indigeſtio*, a want of due coction, either in the food, the humours of the body, or excrements.

INDIGNATORIUS Musculus, a muſcle of the eye, otherwiſe called abducens, and rectus exterior: it has this appellation from its drawing the eye outwards, thereby occaſioning the appearance of ſcorn. See the article Eye.

INDIGO, in commerce, a preparation of the juice of a plant, whoſe leaves are ſmall, fleſhy, and ſoft, of a greeniſh brown colour on the upper ſide, pale, and as it were ſilver-coloured underneath. This plant, by ſome called anil, or nil, has ſeveral ſlender knotty ſtalks, which ſpread into ſmall branches, clothed each with from four to ten pair of theſe leaves, and an odd one at the end: it riſes to the height of about two feet, and produces reddiſh flowers, in ſhape reſembling thoſe of broom, but ſmaller, followed by oblong pods, containing the ſeeds.

Labat has given a particular account of the culture of the plant, and the preparation of the indigo. The ground being thoroughly cleared from weeds, one of the principal points in the culture, a number of ſlaves, ranged in a line, march acroſs, making little trenches of the width of their hoes, and two or three inches deep, about a foot diſtance from each other every way: then returning, they drop ſome ſeeds in each trench, and afterwards cover them with the earth taken out. In moiſt weather, the plant comes up in three or four days; and in about two months after, it is fit for cutting: if ſuffered to ſtand till it runs into flower, the leaves become too dry and hard, and the indigo obtained from them proves leſs in quantity, and leſs beautiful: the due point in maturity is known, by the leaves beginning to grow leſs ſupple, or more brittle. In rainy ſeaſons the cutting may be repeated every ſix weeks: cutting in dry weather kills the plant, which, if that is avoided, continues to afford freſh crops for two years.

A large quantity of the herb is put into a vat or ciſtern of ſtrong maſon work, with ſo much water as is ſufficient to cover it, and ſome wood laid above to prevent its riſing up. The matter begins to ferment, ſooner or later, according to the warmth of the weather, and the maturity of the plant, ſometimes in ſix or eight hours, and ſometimes in not leſs than twenty. The liquor grows hot, throws up a plentiful froth, thickens by degrees, and acquires a blue colour inclining to violet. At this time, without touching the herb, the liquor impregnated with its tincture is let out, by cocks in the bottom, into another vat placed for that purpoſe, ſo as to be commanded by the firſt.

In the ſecond vat the liquor is ſtrongly and inceſſantly beat and agitated, with a kind of buckets fixed to poles, till the colouring matter is united into a body. A good deal of nicety is requiſite in hitting this point; if the beating is ceaſed too ſoon, a part of the tinging matter remains diſſolved in the liquor; if continued a little too long, a part of that which had ſeparated is diſſolved afreſh. The exact time for diſcontinuing the proceſs is determined, by taking up ſome of the liquor occaſionally in a little cup, and obſerving whether the blue fecula is diſpoſed to ſeparate and ſubſide.

The whole being now ſuffered to reſt till the blue matter has ſettled, the clear water is let off by cocks in the ſides at different heights; and the blue part diſcharged by a cock in the bottom, into another vat: here it is ſuffered to ſettle for ſome time longer; then further drained in cloth bags, and expoſed in ſhallow wooden boxes to the air, till thoroughly dry.

The author abovementioned, from whom the whole of the foregoing account is extracted, obſerves further, that the goodneſs of the indigo depends greatly upon the age of the plant; that before it has grown fully ripe, the quantity it yields is leſs, but the colour proportionably more beautiful; that probably the ſecret of thoſe, whoſe indigo has been moſt eſteemed, is no other than cutting the herb at the time when it yields the fineſt colour; that the ſuperiority of ſome of the indigoes of the Eaſt-Indies to thoſe of America, is perhaps owing to the former being prepared more curiouſly from only the leaves of the plant; and that by beating the herb in the ſteeping vat, which has been practiſed by ſome with a view to increaſe the quantity, great part of the ſubſtance of the leaves and bark is blended with the water along with the colouring matter, and the indigo extremely debaſed.

It is ſaid that lime or lime-water is ſometimes employed in the beating vat, to promote the ſeparation of the tinging particles from the water; and that the hardneſs or flintineſs of ſome ſorts of indigo is owing to an over-proportion of this addition.

Indigo is commonly divided, from the colour which it exhibits upon breaking, into three kinds, copper-coloured, purple, and blue. It is ſaid that the dyers uſe chiefly the firſt; and the callico-printers, for this drug gives a durable ſtain to linen as well as woollen, the laſt. On what particular circumſtances theſe different appearances depend, we know not; nor is it certainly known, whether the real quality of the indigo has any connexion with them. The deepeſt and livelieſt indigo, rubbed with the nail, looks like poliſhed copper; and ſolutions of all the ſorts, made in alkaline lixivia, aſſume alike a copper-coloured ſkin upon the ſurface.

Good indigo is moderately light, breaks of a ſhining ſurface, and burns almoſt wholly away upon a red-hot iron. It is quickly penetrated by water, and reduced into a kind of paſte: a conſiderable part is at the ſame time diffuſed through the liquor, and very ſlowly ſubſides. This is probably what Labat and Hellot mean by its diſſolving in water; for no part of the indigo really diſſolves; it cannot indeed be expected that it ſhould from the proceſs by which it is obtained.

INDIVIDUAL, *Individuum*, in logic, a particular being of any ſpecies, or that which cannot be divided into two or more beings equal or alike.

INDIVISIBLE, among metaphyſicians. A thing is ſaid to be indiviſibly abſolute, abſolutely indiviſible, that is a ſimple being, and conſiſts of no parts into which it may be divided. Thus God is indiviſible in all reſpects, as is alſo the human mind, not having extenſion or other properties of body.

INDIVISIBLE *Secundum quid eſt*, indiviſible with reſpect to what is now is, a ſubſtance which, though it conſiſts of parts into which it may be divided, yet never can be be ſo divided as to remain the ſame: thus a meaſure or number is ſaid to be indiviſible, for if from a foot-line, for example, any thing is deducted, it is no more a foot-line; and if from the number three any thing is ſubtracted, it is no longer the ſame number. See the next article.

INDIVISIBLES, in geometry, the elements or principles into which any body or figure may be ultimately reſolved; which elements are ſuppoſed infinitely ſmall: thus a line may be ſaid to conſiſt of points, a ſurface of parallel lines, and a ſolid of parallel and ſimilar ſurfaces; and then, becauſe each of theſe elements is ſuppoſed indiviſible, if in any figure a line be drawn through the elements perpendicularly, the number of points in that line will be the ſame as the number of the elements; whence we may ſee that a parellelogram, priſm, or cylinder, is reſolvible into elements or indiviſibles, all equal to each other, parallel and like to the baſe; a triangle into lines parallel to the baſe, but decreaſing in arithmetical proportion, and ſo are the circles which conſtitute the parabolic conoid, and thoſe which conſtitute the plane of a circle, or ſurface of an iſoſceles cone. See the article INFINITESIMALS.

INDORSEMENT, in law, any thing written on the back of a deed, as a receipt for money received. See the article BILL.

INDUCEMENT, in law, ſignifies what may be alledged as a motive; and, in our law, it is uſed ſpecially in ſeveral caſes; as, there is an inducement to actions, to a traverſe in pleading, and to an offence committed, &c.

INDUCTION, in law, is putting a clerk or clergyman in poſſeſſion of a benefice or living to which he is collated or preſented. See the article PRESENTATION.

INDULGENCES, in the Romiſh church, are a remiſſion of the puniſhment due to ſins, granted by the church, and ſuppoſed to ſave the ſinner from purgatory. Clement VI. in his decretal, which is generally received by the church of Rome, declares, that our ſaviour has left an infinite treaſure of merits, ariſing from his own ſufferings, beſides thoſe of the bleſſed virgin and the ſaints; and that the paſtors and guides of the church, and more eſpecially the popes, who are the ſovereign diſpoſers of this treaſure, have authority to apply it to the living, by virtue of the keys, and to the dead, by way of ſuffrage, to diſcharge them from their reſpective proportions of puniſhment, by taking juſt ſo much merit out of this general treaſure, as they conceive the debt requires, and offering it to God.

It was the great abuſe of indulgences that contributed not a little to the firſt reformation of religion in Germany, where Martin Luther began firſt to declaim againſt the preachers of indulgences, and afterwards againſt indulgences themſelves: for ſince that time the popes have been more ſparing in the exerciſe of this power; however, they ſtill carry on a great trade with them in the Indies, where they are purchaſed at two reals a piece, and ſometimes more.

INDULT, in the church of Rome, the power of preſenting to benefices granted to certain perſons by the pope.

INDULTO, a duty, tax, or cuſtom, paid to the king of Spain, for all ſuch commodities as are imported from the Weſt-Indies in the galleons. See the article GALLEONS.

INERTIA *of Matter*, in philoſophy, is defined by Sir Iſaac Newton to be a paſſive principle by which bodies perſiſt in their motion or reſt, receive motion in proportion to the force impreſſing it, and reſiſt as much as they are reſiſted. It is alſo defined by the ſame author to be a power implanted in all matter whereby it reſiſts any change endeavoured to be made in its ſtate.

This power then coincides with the *vis reſiſtendi*, or power of reſiſting, whereby every body endeavours, as much as it can, to perſevere in its own ſtate, whether of reſt or uniform rectilinear motion; which power is ſtill proportionable to the quantity of matter in any body: for ſince natural bodies conſiſt of a maſs of matter, that, of itſelf, is not able to induce any change in its ſtate, if bodies were once at reſt, it is neceſſary that they ſhould always remain in that ſtate of reſt, unleſs there is applied a new force to produce motion in them: but if they were in motion, the ſame energy or force would always preſerve the motion; and therefore bodies would always retain their motion, and would always proceed forward in the ſame right-line with the ſame tenor, ſince they cannot of themſelves acquire either reſt or a retardation, or a change of their direction to turn on one ſide or the other.

Since, according to this law, a body once in motion always continues in that motion, the philoſophers aſk, Why all projectiles loſe by degrees their motion? Why do they not proceed in infinitum? If motion did not of its own nature decay, a ſtone thrown at the beginning of the world, would by this time gone through an immenſe and almoſt infinite ſpace. And ſo indeed it would, if its motion had been in vacuo, or in free ſpaces, and without any gravity. But ſince all projectiles are carried either through the air, or on the rough ſurfaces of other bodies, they muſt be neceſſarily retarded: for ſince all bodies in motion muſt drive and thruſt out of its place the reſiſting air, or overcome the roughneſs of the ſuperficies upon which they are moved, they will loſe all that force and motion that is conſtantly employed in overcoming theſe obſtacles, and conſequently the motion of projectiles will be continually diminiſhed: but if there was no reſiſtanee in the medium, no roughneſs in the ſuperficies on which they were moved, no gravity that continually forces the bodies toward the earth, motion would always continue the ſame, without any retardation at all. So in the heavens, where the medium is exceedingly rare, the planets do continue their motions for a very long time; and upon ice, or any other very ſmooth ſurface without any roughneſs, heavy bodies in motion are not ſoon brought to reſt.

INFALLIBLE, what cannot deceive, nor be deceived.

The word is Latin, and formed of *in*, taken privately, and *fallo*, to deceive.

INFAMOUS, in general, denotes ſomething notoriouſly contrary to virtue or honour.

The word is derived from the Latin *in*, and *fama*, report.

INFAMOUS, in law, denotes a perſon of no repute in the world. There are two kinds of infamy; ſome perſons being infamous *de jure*, or ſtigmatized by public judgments; others are infamous *de facto*, as being of a ſcandalous profeſſion, as a catchpole, hangman, informer, &c.

INFANT, *Infans*, in medicine, denotes a young child. See the articles CHILD and DELIVERY.

INFANT, in law, ſignifies a perſon under the age of one and twenty.

INFANTE and INFANTA, all the ſons and daughters of the kings of Spain and Portugal, except the eldeſt; the princes being called infantes, and the princeſſes infantas.

INFANTRY, in military affairs, denotes the whole body of foot-ſoldiers. See the articles FOOT and SOLDIERS.

INFECTION, among phyſicians, the ſame with contagion. See CONTAGION.

INFERNAL-STONE, *Lapis infernalis.* See the article LAPIS.

INFINITE, that which has neither beginning nor end: in which ſenſe God alone is infinite. See the article GOD.

Infinite is alſo uſed to ſignify that which has had a beginning, but will have no end, as angels and human ſouls. This makes what the ſchoolmen call *infinitum a parte poſt*; as, on the contrary, by *infinitum a parte ante*, they mean that which has an end but had no beginning.

INFINITE, in mathematics, are ſuch quantities as are either greater or ſmaller than any aſſignable one, being the ſame with indefinite or indeterminate, to which no certain limits are preſcribed.

The doctrine of infinites has given occaſion for many diſputes; but the true ſtate of the caſe is this: So long as we reaſon upon wrong ſuppoſitions, we muſt never expect to arrive at truth; but the nearer our ſuppoſitions are to truth, the nearer will be the concluſion; and if theſe ſuppoſitions be infinitely near the truth, the errors in the concluſion will be infinitely ſmall, which being at laſt thrown out of the account, the concluſion will be the ſame as if we had proceeded upon principles accurately true. This is the true riſe of infinitely ſmall quantities in all mathematical computations, and the true reaſon for rejecting them, when the operation is over. But it may be reaſonably demanded, How do we know that theſe infinitely ſmall errors in the concluſion ariſe from ſimilar errors in the premiſes? And the anſwer is, becauſe theſe two ſorts of errors have ſo mutual a dependence one upon an another, that one cannot be made to vaniſh, but the other will neceſſarily vaniſh with it. If it be further demanded, What the wrong ſuppoſitions are from which theſe infinitely ſmall errors ſpring? We anſwer, in the firſt place, the ſuppoſing magnitudes to have quantity, which in reality have none at all, but have entirely loſt it, either by running into infinity on the one hand, or into nothing on the other. Thus, if we ſuppoſe the point D to actually coincide with the angular point C (pl. LXIV. *fig.* 3.) the line D C will not only comparatively, but abſolutely be equal to nothing; that is, it will be no line at all, nor can any uſe be made of it; but by allowing the ſaid line to have ſome quantity, though extremely ſmall, or leſs than any that can be aſſigned, we tacitly ſuppoſe the point D not to be actually in the angular point C, but infinitely near it.

A quantity, after it is reduced to nothing, ceaſes to be a quantity; and if o have no quantity, neither can its reciprocal $\frac{1}{0}$, or any magnitude expreſſed by it, be ſaid to have any: but the reciprocal of nothing ſignifies a magnitude infinitely great in the ſtricteſt ſenſe of the word, and can no more be ſaid to have quantity than abſolute nothing can; and to compare ſuch magnitudes in reſpect of their quantity, which actually have none, is contrary to the definition both of ratios, and the object of proportion: nay, we know not whether the greateſt part, if not all, the difficulties that are ſaid to attend the idea of infinity, and our inability to comprehend it ought not rather to be charged upon the abſurdity of comparing things together which in their own natures are incapable of all compariſon. It is ſaid indeed that infinite parallelopipeds, ſtanding perpendicular upon finite baſes, and upon the ſame plane, are in proportion as their baſes; which is true; but this is not comparing magnitudes in reſpect of the quantity they have not, but in reſpect of the quantity they have; one of theſe parellelopipeds may be ſaid to be broader or thicker than another, though not higher. Thus, if r be any quantity whereof the multiples $2r$ and $3r$ are taken, $2r$ may be ſaid to be to $3r$ as 2 to 3, whether r be finite or infinitely great or ſmall; nay, though r ſhould ſignify an impoſſible quantity; as $\sqrt{-1}$, $\sqrt{-2}$, &c. but then the quantity of this proportion does not depend upon the quantity r, but upon the coefficients 2 and 3: but we muſt here take notice however, that if r be actually infinite, we mean in the ſtricteſt ſenſe of the word, by $2r$ and $3r$ muſt then be meant, not quantities twice or thrice as big as r, in the ſame reſpect wherein it is infinite, but r twice or thrice taken, which is no way abſurd; for if it be poſſible for any one infinite quantity to exiſt, that is not every way infinite, it will be as poſſible for others to exiſt of the ſame kind, independently of the former: a parallelopiped, that is infinitely extended only as to its length, and that both forwards and backwards, may however receive any addition, or be increaſed or diminiſhed in any proportion in reſpect of its finite dimenſions, but not in reſpect to its infinite dimenſions; and this is all the proportion we can conceive infinite quantities capable of. See *Philoſophical Tranſactions*, N°. 195.

That lines or quantities may continually decreaſe, and yet never become nothing, may be eaſily ſhewn in the following manner.—Let M C L K (*fig.* 4.) be an indefinite right line, P a given point out of that line; from P draw P C B perpendicular to M C L K, and of any length at pleaſure; from P draw P E, P F, P I, &c. obſerving always to make the ſegments D E, T F, L I, &c. of theſe lines conſtantly equal to C B: from the points E, F, I, &c. let fall upon M C K the perpendiculars E G, F H, I K, &c. It is very evident that each following perpendicular is ſhorter than any of the preceding ones; and it is as evident, that were the number of them ever ſo great, the laſt perpendicular would be of a finite length, becauſe its correſponding hypotheneuſe does, by the hypotheſis, form a finite angle with the indefinite line M C L K, and does alſo conſtantly riſe above it.

Mathematicians, and more eſpecially thoſe who underſtand this ſubject, are, generally ſpeaking, reſerved enough upon it, and chuſe rather to be deficient than redundant in their expreſſions upon theſe occaſions; not from any diffidence in their own principles, but knowing very well how liable matters of this nature are to be drawn into diſputes by ſuch as lie upon the catch, and make it their chief buſineſs to oppoſe the truths which they themſelves could never have diſcovered, nor perhaps will ever be able to underſtand.

INFINITE *Series*. See SERIES.

INFIRMARY, a kind of hoſpital, where the weak and ſickly are properly taken care of. See the article HOSPITAL.

INFLAMMABILITY, that property of bodies, which diſpoſes them to kindle, or catch fire. See the articles FIRE, FLAME, HEAT, &c.

INFLAMMATION, in ſurgery and medicine, is defined to be a preſſure and attrition of the red arterial blood, ſtagnating in the ſmalleſt canals, produced by the motion of the reſt of the blood, thrown into a violent and forcible commotion, by means of a fever.

This definition of an inflammation is taken from its cauſes. Others define it from its ſymptoms to be a ſpecies of a tumour attended with a burning heat, pain, redneſs, reſiſtance, and a continual pulſation and pricking. See TUMOUR.

Inflammations are either external, being ſuch as fall properly under the buſineſs of ſurgery, and are cured by manual operations and topical remedies; or internal, being ſuch whoſe cure is to be expected chiefly from the uſe of internal remedies. See the article FEVER.

General Criſes and Cure of INFLAMMATIONS. Inflammations terminate variouſly, according to their different degrees of violence, the cauſes from whence they ariſe, the parts which they effect, and the particular conſtitution of the patient, with ſeveral other circumſtances which alſo preſage to us what ſhall be the end of the inflammation. But the ſeveral ways wherein an inflammation terminates are chiefly four. It is either 1. ſo diſperſed and reſolved as to vaniſh without leaving any conſiderable injury in the part affected, and which afterwards recovers its former vigour, and is of all others, the beſt courſe it can take; or elſe, 2. the inflammation ſuppurates, and degenerates into an abſceſs, ſo as to leave ever after ſome damage in the organ; or elſe, 3. the inflammation degenerates into a gangrene, or ſphacelus; or, laſtly, into a hard tumour, commonly called a ſchirrous, which grows more compact in the part affected, as the inflammation remits or goes off.

As to the reſolution and diſperſion of an inflammation, that is uſually practicable, where it is only of a milder kind, in a ſound habit of body, when the blood is not yet too viſcid nor vehement in its motion. See the article DISPERSION.

But ſuppuration follows, when the inflammation is more violent, the circulation more rapid, but yet the maſs of blood ſomewhat temperate, and without much acrimony: the treatment of an inflammation that terminates in a ſuppuration, the reader will find delivered under the articles SUPPURATION, ABSCESS, &c.

When the forementioned ſymptoms are much more violent, and when the blood is at the ſame time more acrimonious and rapid than it ought to be, the inflammation generally terminates in a gangrene. See the article GANGRENE.

But if the inflamed part be full of glands, and the blood very thick, glutinous, and inſpiſſated, the ſmall blood veſſels are then ſo ſtrongly ſtuffed up with glutinous blood, that they are compacted together, the parts loſe their ſenſation, and are converted into an hard tumour, which is thence called a ſcirrhus. See the article SCIRRHUS.

INFLAMMATION *in the Breaſts*, a diſorder moſt incident to child bearing women, and almoſt conſtantly happens a few days after their delivery.

If the milk ſhould be propelled too plentifully and forcibly into the breaſt, which at ſuch times frequently happens; and if the mother ſhould then be ſeized with cold, fear, anger, or a ſudden perturbation of mind, the ſanguiferous and lactiferous veſſels being thence obſtructed, the breaſts muſt then become inevitably tumified, which will be attended with great heat, redneſs, reſiſtance, and violent pain. The ſame accident often happens to women that give ſuck even a long time after their lying-in, and is ſometimes the caſe of thoſe who have no milk, all proceeding from the cauſes already mentioned; and Heiſter gives us an inſtance of a man's breaſt being inflamed by means of a great fright. Theſe inflammations do not, according to that author, always happen to be equally intenſe and violent; for ſometimes it ſeizes the whole breaſt; ſometimes only one ſide; and at other times occupies only a ſmall part of the breaſt: ſometimes the inflammation lies very near the ſkin; at other times very deep; and at one time it has urgent ſymptoms, and at another, it ſits eaſy on the part.

This diſorder may be ſpeedily removed in women of condition, and ſuch as do not ſuckle their children, if ſome of the plaſter of ſperma ceti ſpread on linen be applied warm all round the breaſt ſoon after parturition; being perforated in the middle, to tranſmit the papilla or nipple; the acceſſion of the milk being alſo repelled by a very ſtrait bandage. Among the internal remedies, the moſt proper are ſuch as bring down the lochia puerperarum, when they do not flow in ſufficient plenty of themſelves; the principle remedies for this purpoſe are the eſſence of myrrh, amber, the eſſence of ſaffron, elixir proprietatis, &c. Laſtly, with reſpect to the proper drink, it muſt be carefully obſerved to diminiſh the quantity of milk by the ſmallneſs and poverty of the meat and drink, upon which account the patient ſhould be recommended to drink ſmall broth, tea, or the like watery liquors: and if the mother be deſirous of ſuckling the infant, there can be no better preſervative againſt the inflammations of the breaſts. But when the inflammation is fixed, the cure muſt be attempted either by diſperſion or ſuppuration, for the method of which ſee DISPERSION and SUPPURATION.

But it often happens that the tumour will neither yield to diſperſion nor ſuppuration, and is in danger of turning to a ſcirrhus, or cancer, the patient muſt be kept in good ſpirits, and the plaſter of ſperma ceti be conſtantly retained on the tumour, by which means it will probably either grow leſs, or elſe vaniſh.

INFLAMMATION *of the Bladder*, that attended with an acute, burning, preſſing pain, in the region of the pubes, a fever, and a continual teneſmus, or deſire of going to ſtool, and a perpetual ſtriving to make water.

Other ſymptoms of this diſeaſe are a rumbling of the bowels, griping pains, great anxiety of the præcordia, difficult breathing, want of appetite, and vomiting, coldneſs of the extreme parts, a hard, quick, unequal, contracted pulſe, inquietude, and ſometimes convulſions. There is another kind which is more ſuperficial, and is either rheumatic or eryſipetalous, in which the fever is more eaſily and ſpeedily cured, by promoting a diaphoreſis; and perſons in years, who are affected with the ſcurvy, gout, rheumatiſm, or violent head-achs, are moſt ſubject to it, eſpecially if they catch cold from a north wind. The former ariſes commonly from the ſtoppage of the menſes, bleeding piles, or other uſual ſanguinary evacuations, and not ſeldom from a virulent gonorrhœa, unſkilfully ſuppreſſed by aſtringents; or when treated by medicines of too ſharp and hot a nature.

This diſeaſe is mortal, if it terminates in an ulcer, or mortification: the latter is immediate death.

The cure muſt be attempted, ſays Hoffman, with bleeding in the foot, if a ſuppreſſion of the menſes or hæmorrhoidal flux be the cauſe. If it proceeds from the ſcurvy, &c. recourſe muſt be had to gentle diaphoretics, diluents, and remedies which obtund the acrimony of the humours, ſuch as decoctions of the root of ſcorzonera, china, ſkirrets, and fennel. Alſo infuſions in the manner of tea of the tops of yarrow, flower of mallows, winter cherries, and ſeed of daucus, made with milk, and ſweetened with ſyrup of marſh-mallows. To theſe may be added emulſions of the four cold ſeeds. If the patient is coſtive, manna will be proper with antimonial nitre, to which rhubarb may be joined, as occaſion requires. If the diſeaſe is violent, diaphoretic powders with nitre, in a larger proportion than ordinary, as alſo five grains of ſaffron, and two of camphire, with the emulſions aforeſaid. External antiſpaſmodics, and gentle diſcutients will be proper; for which purpoſe it was Hoffman's method to apply bladders, filled with a decoction of emollient flowers. If the teneſmus and difficulty of urine ariſe from ſpaſms, there is nothing better than the vapours of a decoction in milk of the flowers of melilot, elder, chamomile, and mallows, and the tops of yarrow. This decoction may be put into a cloſe-ſtool, and the patient ſit over it.

INFLAMMATION *of the Brain*. See PHRENSY.

INFLAMMATION *of the Diaphragm*. See the article PARAPHRENITIS.

INFLAMMATION *of the Eyes*. See the article OPHTHALMIA.

INFLAMMATION *of the Fauces*. See the article QUINSEY.

INFLAMMATION *of the Inteſtines*, according to Boerhaave, is an inflammation contracting the inteſtines, and ſtopping up the paſſage through them; attended with a vehement, fixed, burning pain, which is irritated by things taken inwardly.

When the inflammation is in the upper part of the inteſtines, the ſtomach will be greatly diſtended with wind. When the pain is exaſperated, it produces convulſions of the diaphragm and abdominal muſcles, vomiting, and painful inflations, with rumblings and ſharp griping pains, which may bring on the iliac paſſion, or twiſting of the guts. Hoffman ſays, that when there is a burning pain in the abdomen, with a preternatural heat of the whole body, as alſo a quick pulſe, loſs of ſtrength, anxiety and inquietude, the ſeat of the diſeaſe may juſtly be ſuſpected to be in the inteſtines. If the pain is above the navel, and below the ſtomach, attended with a fever, nauſea, and reaching, it is a ſign that that part of the colon is affected which lies beneath the ſtomach, and is extended from the right to the left ſide. If the pain lies in the right hypochondrium, under the ſpurious ribs, it ſhews that part of the colon to be inflamed where it joins with the ilium. When the complaint is on the left ſide, under the loins, where the pſoas muſcle is placed, it is a ſign that the colon, and that part of the meſentery joined thereto, is the ſeat of the diſeaſe, eſpecially when it adheres to the peritonæum: but when the pain is in the middle of the abdomen about the navel, it ſhews the ſmall guts are certainly affected; in all which caſes, the pain is ſuppoſed to be attended with a fever.

Arbuthnot adviſes, that this diſeaſe be carefully diſtinguiſhed from a colic, proceeding from a cold cauſe; becauſe what is good for the latter is poiſon in the former. It muſt have a ſpeedy remedy, or it will ſoon, according to that writer, end in the iliac paſſion, or a mortification. Beſides copious bleeding, he thinks there is ſcarcely any other method of cure, than fomenting and relaxing the bowels with emollient liquids taken warm, both by the mouth and in clyſters, and this every hour: warm fomentations, or young, vigorous, and ſound animals applied to the body are extremely beneficial.

Boerhaave directs, that the patient ſhould only be nouriſhed with broth, in which gentle detergent roots have been boiled.

After bleeding and clyſters, if the pain continues violent, Hoffman is of opinion, that there will be no manner of danger in giving opiates, by which means the excruciating pain will be alleviated, and the ſpaſms appeaſed, and a breathing ſweat will follow. When this is done, and the fever abated, there will be no occaſion to continue the dilating, relaxing, and moiſtening medicines, but rather the nervous and corroborating; ſuch as the preparations of amber, eſpecially the ſalt and tincture; the former of which may be given in a bolus from ſix to ſixteen grains, and the latter from twenty to eighty drops, in any convenient vehicle.

If the patient ſurvives three days, and the acuteneſs of the pain abates with a chilneſs and ſhivering throughout the whole body, it is a ſign of a ſuppuration; and within fourteen days the impoſthume will break, and if it falls into the cavity of the abdomen, it will corrupt the whole maſs of fluids, putrify the viſcera, and turn to an aſcites; whence the patient will die of a conſumption. In this caſe, Boerhaave and Arbuthnot recommend whey and chalybeat waters, as likely to prove moſt beneficial. The impoſthume may turn either to a gangrene or ſcirrhus, both which are mortal.

INFLAMMATION *of the Kidneys.* See the article NEPHRITIS.

INFLAMMATION *of the Liver.* When the liver is inflamed, it compreſſes the ſtomach, diaphragm, and the neighbouring viſcera of the abdomen; it ſtops the circulation of the fluids, hinders the generation and excretion of the gall, and all digeſtion; it produces a great many bad ſymptoms, as the jaundice, with all the diſeaſes depending thereon. See HEPATASIS.

A fever, an inflammation, and pungent pain on the region of the liver, and diaphragm, a tenſion of the hypochondria, yellowneſs of the ſkin and eyes, and a ſaffron-coloured urine, are ſigns of an inflammatory diſpoſition of the liver. See JAUNDICE.

This diſeaſe terminates as other inflammations; being cured by reſolution, concoction, and excretion, of the morbid matter; or it terminates in an abſceſs, ſcirrhus, or gangrene. See ABSCESS, &c.

During the firſt ſtate, Arbuthnot tells us, that a warm regimen and ſaffron, which ſome reckon a ſpecific, are improper. On the other hand, that cooling reſolving liquors, taken inwardly, as whey with ſorrel boiled in it, outward fomentations, and frequent injections of clyſters, bathing and frictions, relax and render the matter fluid. Honey, with a little rheniſh wine and vinegar, the juices and jellies of ſome ripe garden fruits, and thoſe of ſome lacteſcent plants, as endive, dandelion, and lettuce, are reſolvent. Violent purging hurts; gently relaxing the belly relieves, diluents with nitrous ſalts are beneficial, or tamarinds boiled in warm water, or whey. The feveriſh matter is often carried off by urine, and therefore diuretics, not highly ſtimulating, are proper.

If the inflammation be recent, extremely violent, and without any ſigns or hopes of reſolution, concoction, and excretion, Boerhaave adviſes, that the caſe be treated with the ſame cautions and remedies as are directed in pleuriſies, and other ſimilar inflammatory diſorders; ſuch remedies only excepted, as the ſituation of the part affected cannot admit of, except only, that all antiphlogiſtic fluids, either drank or injected by clyſters, are particularly ſerviceable in the caſe before us.

INFLAMMATION *of the Lungs.* See the article PERIPNEUMONY.

INFLAMMATION *of the Pleura.* See the article PLEURISY.

INFLAMMATION *of the Stomach* is known by a burning, fixed, and pungent pain in the ſtomach, which is exaſperated at the inſtant any thing is taken into it, and is ſucceeded by a moſt painful vomiting and hiccough. There is, beſides, an inward heat, anxiety, and a tenſive pain about the præcordia, an acute continual fever, great thirſt, difficult breathing, inquietude, toſſing of the body, coldneſs of the extreme parts, a hard, contracted, quick, and ſometimes unequal, pulſe. In the medical eſſays, we have an inſtance in this diſeaſe being attended with a hydrophrobia. See the article HYDROPHOBIA.

Boerhaave ſays, that this diſeaſe, if not ſuddenly cured, is generally mortal: therefore, that as ſoon as it is diſcovered, plentiful bleeding is neceſſary; that the patient's drink ſhould be very ſoft, antiphlogiſtic, and emollient; and alſo that clyſters of the ſame kind ſhould be adminiſtered.

Arbuthnot adviſes, that the patient ſhould totally abſtain from every thing that has acrimony in it; even the cooling nitrous ſalts, which are beneficial in other inflammations, irritate too much. Vomits, cordials, and ſpirituous liquors, are little better than poiſon: milk generally curdles. Aliments muſt be given frequently, and by a ſpoonful at a time, for any diſtention increaſes the inflammation. A thin gruel of barley, oatmeal, whey, with a very little ſugar or honey, or chicken broths, are proper aliments: whey emulſions, barley-water, and emollient decoctions are proper drinks. If poiſons of the cauſtic kind, or metallic medicines ill prepared, cauſe the inflammation, oily fat things are proper, as new milk, cream, oil of ſweet almonds, or oil of olives taken often and plentifully, according to Hoffman. If in the cholera morbus an inflammation is apprehended, he adviſes abſorbents and burnt hart's horn, with gelatinous decoctions of calves and neats feet, or hartſhorn-jellies, and water-gruel. Outwardly he recommends the following liniment as uſeful in all caſes; take oil of ſweet-almonds, two ounces; camphire, one dram; make a liniment, with which anoint frequently the precordia, applying a hot linen cloth over it. The following epithem he recommends as an excellent diſcutient and ſudorific. Take of the vinegar of roſes, two ounces; ſpirit of wine camphorated, two drams; tincture of ſaffron, and tincture of caſtor, of each one dram; nitre, half a dram: let this epithem be applied warm to the region of the ſtomach.

If there happens an impoſthume, honey, and even honey of roſes, taken inwardly, is, according to Arbuthnot, a good cleanſer; and decoctions of comfrey-roots, healing.

Inflammation *of the Womb or Uterus*, appears from extraordinary heat and a fixed pain in the groin, with an acute fever, a pain in the loins and belly, an inflation of the abdomen, a ſtimulus to make water and to go to ſtool, heat, and a difficulty of urine.

Other ſymptoms, according to Aſtruc, are a tumor, pain, heat, tenſion of the hypogaſtric region, redneſs of the os uteri, and great heat of the vagina. If the fore part of the uterus is affected, there is a dyſury; if the back part, a teneſmus; frequent faintings and cardialgia, a burning fever; or, if the inflammation is violent, a lipyria, in which the external parts or extremities are cold, and the internal burn, and the pulſe is imperceptible; a delirium and phrenſy; the breaſts ſwell, in proportion as the inflamed uterus.

Hoffman diſtinguiſhes this diſeaſe into the ſuperficial and more profound. He ſays, that it is eaſily formed in child-bed women, and frequently accompanies the milk-fever, and may be cured in a few days if rightly managed. But that when it is more intenſe, and attended with grievous ſymptoms without remiſſion, it kills on the ſeventh, ninth, or eleventh day; a white miliary fever generally ſupervenes, which is the worſt omen, as it ſhews a mortification of the uterus. See the article Miliary Fever.

INFLAMMATORY Diseases. To theſe may be referred the ſeveral diſeaſes mentioned in the preceding article, either attended with a fever, or leſſer inflammation without a fever; beſides all chronic diſorders ariſing from inflammations, the chief of which are old coughs, conſumptions, and the rheumatiſm, without a fever. See Cough.

Inflammatory Fevers are diſtinguiſhed into two ſtages; the firſt, whilſt the pulſe continues hard, in which it is proper to bleed; the ſecond, when the inflammatory ſymptoms ſtill remaining, the pulſe is too low for that evacuation; in this ſtate bliſters are the chief remedy, and which, except in a few ſingular caſes, are not to be uſed ſooner. If the bliſters are large, it is better to apply them gradually, than many at a time. See Fever and Inflammation.

Point of INFLECTION. When a curve A F K (plate LXIV. *fig.* 5.) is partly convex, and partly concave, to a right line A B or point B; the point F dividing the convex from the concave part, or the end of the one, and the beginning of the other, is called the point of inflection, when the curve being come to F, continues its courſe towards the ſame parts; and the point of retrogreſſion, when the curve returns back again towards the place of its beginning.

Let us ſuppoſe the curve A F K to have the right line A B as a diameter, and the ordinates P M, E F, &c. parallel to each other. Now if you draw the ordinate F E from the point F, and the tangent F L; alſo another ordinate M P from the point M in the concave part A F of the curve, likewiſe a tangent M T; then it is evident that, in curves having a point of inflection, while the abſciſs A P conſtantly increaſes, the part A T of the diameter, intercepted between the vertex of the diameter A and the point T, where the tangent meets the diameter, does likewiſe increaſe until the point P falls in E, after which it continually decreaſes; therefore A T muſt become a maximum A L, when the point P falls in E, the point ſought.

In thoſe curves that have a point of retrogreſſion, the part AT continually increaſes, and the abſciſs A P till the point T coincides with L, and afterwards it continually decreaſes; whence A E muſt be a maximum, when the point T coincides with L. Now call A E, x; E F, y; then will A L$=\frac{y\dot{x}}{\dot{y}}-x$, and the fluxion of this will be $\frac{\dot{y}\dot{y}\dot{x}-y\dot{x}\dot{x}}{\dot{y}\dot{y}}-\dot{x}$, ſuppoſing $\dot{x}$ invariable; which (being divided by $\dot{x}$ the fluxion of A E) muſt be equal to nothing, or infinite: whence $-\frac{y\ddot{y}}{\dot{y}\dot{y}}=0$, or infinity; and ſo multiplying by $\dot{y}\dot{y}$, and dividing by $-y$, there comes out $\ddot{y}=0$, or infinite. Now, with this laſt expreſſion, and the general equation of a curve, the point of inflection or retrogreſſion F may be found: for the nature of the curve A F K being given, we ſhall have a value of $\dot{y}$ in $\dot{x}$, and putting that value into fluxions with $\dot{x}$ conſtant, we ſhall obtain a value of $\ddot{y}$ in terms of $\dot{x}\dot{x}$; which being made equal to 0, and afterwards to infinity, by means thereof, in either of theſe ſuppoſitions, we may find A E ſo expreſſed, that its correſpondent ordinate E F ſhall interſect the curve in the point of inflection or retrogreſſion F.

Let the ordinates B M, B F, B M, of the curve A F K, all meet in the ſame point B: if any ordinate B M (*fig.* 6.) be drawn, and the tangent M T meeting B T (*fig.* 7.) perpendicular to B M in the point T; and if m (*fig.* 8.) be taken infinitely near M, and the ordinate Bm, tangent mt, the perpendicular Bt to Bm meeting M T in O, be all drawn: then ſuppoſing the ordinate B M, becoming Bm to increaſe, it is plain, in the concave part of the curve, that Bt is greater than B O; and in the convex part the ſame is leſs. So that under the point of inflection or retrogreſſion F, Ot muſt change from negative to poſitive.

This being premiſed, about the center B deſcribe the ſmall arches M R, T H, and there will be formed the ſimilar triangles mR M, M B T, T H O, and the little ſimilar ſectors B M R, B T H. Now put $BM = y$, $MR = \dot{x}$, then $mR\,(\dot{y}) : RM\,(\dot{x}) :: BM\,(y) : BT = \frac{y\dot{x}}{\dot{y}} : MR\,(\dot{x}) : TH = \left(\frac{\dot{x}\dot{x}}{\dot{y}}\right) :: TH \left(\frac{\dot{x}\dot{x}}{\dot{y}}\right) : HO = \frac{\dot{x}\dot{x}\dot{x}}{y\dot{y}}$. Now take the fluxion of $BT \left(\frac{y\dot{x}}{\dot{y}}\right)$ with $\dot{x}$ invariable, and there will ariſe $Bt - BT$ or $Ht = \frac{\dot{x}\dot{y}\dot{y} - y\dot{x}\ddot{y}}{\dot{y}\dot{y}}$; and therefore $OH + Ht$ or $Ot = \frac{\dot{x}^3 + x\dot{y}^2 - y\dot{x}\ddot{y}}{\dot{y}^2}$. Whence multiplying by $\dot{y}^2$, and dividing by $\dot{x}$, the expreſſion $\dot{x}^2 + \dot{y}^2 - y\ddot{y}$ muſt be nothing or infinite in the point of inflection or retrogreſſion F. Now, by the nature of the curve given, we ſhall have values of $\dot{y}$ in $\dot{x}$, and of $\ddot{y}$ in $\dot{x}^2$, which being ſubſtituted in $\dot{x}^2 + \dot{y}^2 - y\ddot{y}$, there will be produced a quantity, which being made equal firſt to nothing, and afterwards to infinity; by means thereof we may get ſuch a value of BF, that if a circle may be deſcribed from B, with the ſame as a radius, it ſhall cut the curve AFK (*fig.* 5.) in the point of inflection or retrogreſſion F.

Example 1. Let AFK (*fig.* 9) be a curve, the right-line AB being a diameter of it, and let the relation of any abſciſs AE (x) to its correſponding ordinate EF (y) be expreſſed by this equation, $ax^2 = yx^2 + a^2y$. It is required to find ſuch an expreſſion for AE, that the ordinate EF ſhall interſect the curve AFK in the point of inflection F.

The equation of the curve gives $y = \frac{ax^2}{x^2 + a^2}$, and therefore $\dot{y} = \frac{2a^3x\dot{x}}{x^2 + a^2}$, and by taking the fluxion of this quantity with $\dot{x}$ conſtant, there will ariſe $\frac{2a^3\dot{x}^2 \times \overline{x^2 + a^2}^2 - 8ax^2\dot{x}^2 \times \overline{x^2 + a^2}}{\overline{x^2 + a^2}^4}$, which being made equal to nothing, and divided by $2a^3\dot{x}^2 \times \overline{x^2 + a^2}$, will produce $x^2 + a^2 - 4x^2 = 0$. Whence AE (x) $= \frac{a}{\sqrt{3}}$.

If $\frac{1}{3}aa$ be put for its equal xx in the equation of the curve $y = \frac{ax^2}{x^2 + a^2}$, we ſhall have $y = \frac{a}{4}$; ſo that the point of inflection F may be determined without ſuppoſing the curve AFK to be deſcribed.

If AC be drawn parallel to the ordinates EF, and made equal to the given right-line a, and CG be drawn parallel to AB, the ſame will be an aſymptote to the curve AFK. For if x be made infinite, we may take xx for $xx + aa$, and therefore the value of y will then become equal to a.

Example 2. Let AFK (*fig.* 10.) be the conchoid of Nicomedes, and the point P the pole, the the right-line BC the aſymptote. It is required to find the point of inflection F; the nature of the curve being ſuch, that a right-line PF, drawn from any point F in it to the pole P, meeting the aſymptote BC in D, the part DF thereof is always equal to a given and conſtant quantity a.

Draw PA perpendicular, and EF parallel to BC, alſo DL parallel to BA. Put $BE = x$, $EF = y$, then by the ſimilar triangles DLF, PEF, DL (x) : LF $(\sqrt{a^2 - x^2}) ::$ PE $(b + x)$: EF $(y) = \frac{\overline{b + x} \times \sqrt{a^2 - x^2}}{x}$.

The fluxion of this will be $\dot{y} = \frac{x^3\dot{x} + a^2b\dot{x}}{x^2\sqrt{a^2 - x^2}}$. Now if you take the fluxion of it again, and make the ſame equal to nothing, there will ariſe $\frac{\overline{2a^4b - a^2x^3 - 3a^2bx^2} \times \dot{x}^2}{\overline{a^2x^3 - x^5} \times \sqrt{a^2 - x^2}} = 0$, which may be reduced to $x^3 + 3bx^2 - 2a^2b = 0$; and one of the roots thereof will be the quantity of BE ſought.

If $a = b$, the equation aforegoing will become $x^3 + 3ax^2 - 2a^3 = 0$, which divided by $x + a$, gives $xx + 2ax - 2aa = 0$; and thence x or BE equal to $\sqrt{3a^2} - a$.

INFLECTION, in grammar, the variation of nouns and verbs, by declenſion and conjugation. See DECLENSION and CONJUGATION.

INFLEX LEAF, among botaniſts, one whoſe point bends inward, towards the ſtem of the plant. See the article LEAF.

INFLUENCE, a quality ſuppoſed to flow from the heavenly bodies, either with their light or heat; to which aſtrologers idly aſcribe all ſublunary events.

IN FORMA PAUPERIS, in law. See the article FORMA.

INFORMATION, in law, is nearly the ſame in the crown-office, as what in our other courts is called a declaration.

INFORMER, a perſon that informs againſt or proſecutes another, upon any penal ſtatute.

INFORMIS, ſomething irregular in its form, or figure. See the articles FIGURE and FORM.

Hence, *ſtellæ informes*, in aſtronomy, are ſuch of the fixed ſtars as are not reduced into any conſtellation. See the articles CONSELLATION and STAR.

INFRALAPSARIANS, in church-hiſtory, an appellation given to ſuch predeſtinarians, as think the decrees of God, in regard to the ſalvation and damnation of mankind, were formed in conſequence of Adam's fall. See PREDESTINATION.

INFRASCAPULARIS, in anatomy, one of the depreſſor-muſcles of the arm, which has its origin from the whole internal ſurface of the ſcapula, and its termination in the interior part of the humerus. See the article DEPRESSOR.

INFRASPINATUS, in anatomy, one of the abductory-muſcles of the arm, which has its origin in the cavity below the ſpine of the ſcapula. See the article ABDUCTOR.

INFUNDIBILIFORM, an appellation given

by botaniſts to thoſe flowers whoſe corollæ are monopetalous and funnel-ſhaped, having a narrow tube at one end, and gradually widening towards the limb or mouth. There are two kinds of theſe flowers, one the figure of a cone, and the other plain or flat, ſomewhat like a ſaucer, and thence called hypocrateriform; of the firſt kind is bugloſs, and of the laſt form is turnſole, with many other genera.

INFUSION, in pharmacy, a method of obtaining the virtues of plants, roots, &c. by ſteeping them in a hot or cold liquid.

INGANNO, in muſic, is when having done every thing proper for ending a cadence, a mark of ſilence is placed inſtead of the final, which the ear naturally expects, and is deceived. See CADENCE.

INGOT, a maſs of gold or ſilver, melted down and caſt in a mould, but not coined or wrought. See GOLD and SILVER.

INGREDIENTS, in pharmacy, whatever ſimple medicine enter the compoſition of a compound one

INGRESS, in aſtronomy, ſignifies the ſun's entering the firſt ſcruple of one of the four cardinal ſigns, eſpecially Aries.

INGRESS, EGRESS, and REGRESS, in law, words frequently uſed in leaſes of lands, which ſignify a free entry into, a going out of, and returning from ſome part of the premiſes leaſed to another.

INGROSSER, one who buys up great quantities of any commodity, before it comes to market, in order to raiſe the price.

INGROSSER alſo ſignifies a clerk or perſon who copies records, deeds, or other inſtruments of law, on ſkins of parchment.

INGUEN, in anatomy, the ſame with what is otherwiſe called groin, or bubes. See PUBES.

INGUINAL, in anatomy, &c. any thing belonging to the groin. Hence,

INGUINAL HERNIA is a hernia in that part, called by ſurgeons bubonocele. See BUBONOCELE.

INHARMONICAL RELATION, in muſic, is much the ſame with diſcord.

INHERITANCE, a perpetual right or intereſt in lands, inveſted in a perſon and his heirs.

INHIBITION, a writ to forbid a judge's proceeding in a cauſe that lies before him.

INHUMATION, in chemiſtry, a method of digeſting ſubſtances, by burying the veſſel in which they are contained in horſe-dung or earth. See the article DIGESTION.

INJECTION, in ſurgery, the forcibly throwing certain liquid medicines into the body by means of a ſyringe, tube, clyſter-pipe, or the like.

Anatomical INJECTION, the filling the veſſels with ſome coloured ſubſtance, in order to make their figures and ramifications viſible.

INITIATED, in antiquity, a term chiefly uſed in ſpeaking of perſons who were admitted to a participation of the ſacred myſteries among the heathens. See the article MYSTERY.

INJUNCTION, in law, is a writ or kind of prohibition granted in ſeveral caſes; and for the moſt part grounded on an interlocutory order or decree, made in the court of chancery or exchequer for ſtaying proceedings either in courts of law, or eccleſiaſtical courts.

INJURY, any wrong done to a man's perſon, reputation, or goods. See the articles ASSAULT, TRESPASS, &c.

INK, *Atramentum*, a black liquor generally made of an infuſion of galls, copperas, and a little gum-arabic.

Compoſition of common Black INK. — "Take one gallon of ſoft water, and pour it boiling hot on one pound of powdered galls, put into a proper veſſel; ſtop the mouth of the veſſel; and ſet it in the ſun in ſummer, or in winter where it may be warmed by any fire; and let it ſtand two or three days. Add then half a pound of green vitriol powdered; and having ſtirred the mixture well together with a wooden ſpatula, let it ſtand again for two or three days, repeating the ſtirring; when add further to it five ounces of gum-arabic diſſolved in a quart of boiling water; and, laſtly, two ounces of alum; after which the ink ſhould be ſtrained through a a courſe linen cloth for uſe."

The galls ſhould be good, or the ink will fail; as it very frequently does from an error in this point. The marks of their goodneſs is, the appearing of a bluiſh colour, and feeling heavy. Where they are light in weight, and of a whitiſh brown colour, without any blue, they ſhould be rejected; or a greater proportion ſhould be uſed.

In moſt of the recipes for the making of ink, gum-arabic is ordered to be put undiſſolved into the mixture of water, galls, and vitriol; but, however common, it is certainly a very injudicious practice; for as the gum-arabic is with ſome difficulty diſſolved in ſimple water, and much more ſo in ſuch as is acidulated by ſalts like the vitriol, and clogged likewiſe with the ſolid part of the galls, it is certainly much better to make a ſolution of it in part of the water of which the ink is to be formed, previouſly to its being commixed with the other ingredients; which would otherwiſe, in ſpite of the moſt frequent ſtirings, keep it at the bottom of the veſſel, and prevent its being ever wholly freed from them, and diſſolved.

Boiling either the infuſion of the galls, or the mixture after the addition of the vitriol, has likewiſe been frequently ordered, and practiſed: but it is not only needleſs, but injurious to the preparation of the ink; as it can have no effect on the vitriol, beſides conducing to the ſolution of it, which is is eaſily effected, in the proportion of water proper to be uſed, without any heat; and with reſpect to the galls, their tinging power reſiding in an eſſential oil that is volatile, and will riſe with leſs heat than that of boiling water, it is neceſſarily leſſened by the evaporation; and conſequently, though more of it may be extracted from the galls, yet leſs will be retained in the fluid, than if infuſion with a gentle heat be uſed, inſtead of decoction.

Preparation of Red-writing Ink.—" Take of the raſpings of Brazil-wood a quarter of a pound, and infuſe them two or three days in vinegar, which ſhould be colourleſs, where it can be ſo procured. Boil the infuſion then an hour over a gentle fire; and afterwards filter it, while hot, through paper, laid in an earthen cullender. Put it again over the fire, and diſſolve in it, firſt half an ounce of gum-arabic, and afterwards of alum and white-ſugar, each half an ounce."

Care ſhould be taken that the Brazil-wood be not adulterated with the Braziletto or Campeachy, commonly called peachy-wood, which is moſtly the caſe when it is ground; and though a very detrimental fraud, in all inſtances of the application of Brazil-wood to the forming bright red colours, cannot yet be perceived after the mixture of the raſpings, but by trial in uſing them; it is therefore much the beſt way, when it is wanted for purpoſes like this, to procure the true Brazil-wood in pieces, and to ſcrape it with a knife, or raſp it with a very bright file; but all ruſt of iron muſt be carefully avoided, by which means all poſſibility of ſophiſtication is of courſe prevented.

Red-ink may likewiſe be prepared by the above proceſs, of white-wine inſtead of vinegar; but it ſhould be ſour, or be diſpoſed to be ſo; otherwiſe, a third or fourth of vinegar ſhould be added, in order to its taking the ſtronger tincture from the wood. Small-beer has been ſometimes uſed for the ſame purpoſe, but the ink will not be ſo bright; and when it is uſed, vinegar ſhould be added, and the quantity of gum-arabic diminiſhed, and the ſugar wholly omitted.

Preparation of Red-Ink *from Vermilion.*—" Take the glair of four eggs, a tea-ſpoonful of white-ſugar or ſugar-candy beaten to powder, and as much ſpirit of wine; and beat them together till they be of the conſiſtence of oil: then add ſuch a proportion of vermilion as will produce a red colour, ſufficiently ſtrong; and keep the mixture in a ſmall phial, or well ſtopped ink-bottle for uſe. The compoſition ſhould be well ſhaken together before it be uſed."

Inſtead of the glair of eggs, gum-water is frequently uſed: but thin ſize made of iſinglaſs with a little honey, is much better for the purpoſe.

Indian-Ink, is a black pigment brought hither from China, which on being rubbed with water, diſſolves, and forms a ſubſtance reſembling ink, but of a conſiſtence extremely well adapted to the working with a pencil; on which account, it is not only much uſed as a black colour in miniature painting, but is the black generally made uſe of for all ſmaller drawings in chiaro obſcuro, or where the effect is to be produced from light and ſhade only.

The preparation of Indian-ink, as well as of the other compoſitions uſed by the Chineſe as paints, is not hitherto revealed on any good authority; but it appears clearly from experiments, to be the coal of fiſh-bones, or ſome other vegetable ſubſtance, mixed with iſinglaſs ſize, or other ſize; and moſt probably, honey, or ſugar-candy, to prevent its cracking. A ſubſtance, therefore, much of the ſame nature, and applicable to the ſame purpoſes, may be formed in the following manner:

" Take of iſinglaſs ſix ounces, reduce it to a ſize, by diſſolving it over the fire in double its weight of water; take then of Spaniſh-liquorice one ounce, and diſſolve it alſo in double its weight of water, and grind up with it an ounce of ivory-black: add this mixture to the ſize while hot; and ſtir the whole together till all the ingredients be thoroughly incorporated: then evaporate away the water in balneo mariæ, and caſt the remaining compoſition into leaden moulds greaſed, or make it up in any other mould."

The colour of this compoſition will be equally good with that of the Indian-ink: the iſinglaſs ſize, mixed with the colours, works with the pencil equally well with the Indian-ink: and the Spaniſh-liquorice will both render it eaſily diſſolvible on the rubbing with water (to which the iſinglaſs alone is ſomewhat reluctant) and alſo prevent its cracking and peeling off from the ground on which it is laid.

INLAYING, the art of marquetry. See Marquetry.

INNATE Ideas, thoſe ſuppoſed to be ſtamped on the mind, from the firſt moment of its exiſtence, and which it conſtantly brings into the world with it: a doctrine which Mr. Locke has abundantly refuted. See the article Idea.

INNOCENTS Day, a feſtival of the Chriſtian church, obſerved on December 28, in memory of the maſſacre of the innocent children by the command of Herod, king of Judea; who, being alarmed at hearing that an infant was born king of the Jews, and imagining that his own kingdom was in danger, ſent orders to have all the children ſlain that were in Bethlehem, and the adjacent country.

The Greek church in their calendar, and the Abiſſinians of Ethiopia in their offices, commemorate fourteen thouſand infants on this occaſion.

INNOMINATA Ossa, in anatomy, three bones, which compoſe the extreme part of the trunk of a human body. Theſe, though ſingle in adults, are in infants three perfectly diſtinct bones, each of which has its peculiar name; the upper one is called the ileum; the anterior one, the os pubis, or os pectinis; and the poſterior one, the os pubis, or os iſchium. Theſe are joined by the intervention of a cartillage, as it were, in the middle of that ſingular cavity called the acetabulum, and continue viſibly diſtinct to the age of puberty; after which they coaleſce, and form one entire bone ſo perfectly, that there is not the leaſt veſtige remaining that they ever were ſeparate.

INNUENDO, a word that was frequently uſed in declarations of ſlander, and law pleadings, when theſe were in Latin, in order to aſcertain a perſon or thing before-mentioned; but now, inſtead of the word innuendo, we ſay, meaning ſo and ſo.

INOCULATION, in medicine, the art of tranſplanting a diſtemper from one ſubject to another, by inciſion, particularly uſed for engrafting the ſmall-pox. See the article Pox.

The deſign of this operation is to communicate by art a milder ſpecies of the ſmall-pox to the infant or adult patient, than that received by the natural infection; and this by engrafting ſome of the variolus matter, in order to which a ſmall inciſion is to be firſt made with a ſcalpel or lancet, through the ſkin of the arm; and having inſerted a ſmall particle of the purulent matter, taken from a mild kind of the pock, the little wound is then to be dreſſed with ſome dry lint, and covered with a plaſter. After the operation, the patient muſt conſtantly keep his chamber, the air of which ſhould be moderately warm, and his diet regulated by ſome prudent phyſician, by which means this diſorder will ſhew itſelf in ſeven or eight days, without any malignant ſymptoms; and if aſſiſted by a proper regimen, and a moderate warmth, it uſually runs through its ſeveral ſtages. When the patient has once had the diſorder this way, though ever ſo mild, it is certain, from experience, that they never have it again; and therefore the opinion of thoſe ſeems to be well grounded, who think that the propagation of the ſmall-pox by inoculation might be of general uſe and benefit to mankind in preſerving the lives of ſome, and the moſt important members of others, as the face, eyes, hearing, viſcera, &c.

Hiſtory informs us, that the diſorder was this way propagated many hundred years ago, among the Greeks, Turks, and Chineſe; whereas it is but of late years that the Europeon nations have come into it, among which the Engliſh ſeem to have approved and followed it moſt. The experiment ſucceeded ſo well in the hands of the Britiſh phyſicians, that king George I. countenanced the ſame in all his dominions, and from thence the practice prevailed with ſucceſs in Germany, particularly in the dominions of Hanover.

INOCULATION, or budding, in gardening, a kind of grafting practiſed in the ſummer months on ſeveral kinds of ſtone fruits, as peaches, nectarines, cherries, plumbs, apricots, &c. alſo upon oranges, jaſmines, and various other ſorts of plants, which ſucceed better by this practice than the common methods of grafting. In order to perform which, being provided with a ſharp knife having a flat haft made for the purpoſe, as alſo with the cuttings of the tree intended to be propagated, proceed to make choice of a ſmooth part of the ſtock intended to be inoculated; if deſigned to be dwarf, five or ſix inches from the ground, but if a ſtandard, it ſhould be budded at the height of five and a half or ſix feet; then with your knife make an horizontal cut acroſs the rind of the ſtock, and from the middle of that cut make a ſlit downwards about two inches in length, being careful not to cut deeper than the thickneſs of the bark, leſt the ſtock is wounded; then having the cutting ready, cut off the leaf from the bud, leaving the footſtalk remaining; cut the bud off lengthways, ſomewhat longer than the ſlit in the ſtock, with part of the wood to it; this done, with your knife ſlip the wood from the bark with a ſudden jerk, and obſerve whether the eye of the bud is left or not, for thoſe buds which loſe their eyes in ſtripping are uſeleſs; then with the handle of the knife gently raiſe the bark on each ſide of the ſlit in the ſtock, and inſert the bud therein, obſerving to place it ſmooth between the rind and wood of the ſtock, cutting off that part of the rind of the bud which may happen to be too long for the ſlit made in the ſtock; ſo having exactly fitted the bud to the ſtock, tie them cloſely round with wetted ſtrong baſs, taking care not to bind round the eye of the bud, which ſhould be left open. In about three weeks or a month the buds will require to be looſened of the bandage, which if not done in time will be very injurious to them, but not to be intirely diveſted of the binding, as it is not amiſs to ſlightly tie them again, which will prevent the bark of the ſtock from flying open, as ſometimes happens, whereby the bud is much injured, if not entirely deſtroyed.

The March following, the ſtock ſhould be cut off about three inches above the place of inoculation, ſloping it the contrary way to the bud; this length is of uſe to faſten the ſhoot which proceeds from the bud, which otherwiſe might be blown out by ſtrong winds: but the autumn following, it ſhould be cut cloſe juſt above the bud, that the place of amputation may the more readily be barked over.

The time for inoculation is from the middle of June to the latter end of Auguſt, according to the ſeaſon and the forwardneſs of the different ſorts of trees intended to be budded, which muſt be known by trying if the buds will ſeparate from the wood eaſily. The firſt ſort of fruit commonly inoculated is the apricot, and the laſt the orange; although the orange is commonly budded in Auguſt, it is very proper to try the operation in July, which I have done with ſucceſs; and thoſe ſtocks which miſcarry may be budded the ſucceeding month, or even in September; but let it be done when it will, it is proper to put them in a gentle heat, giving plenty of water, by which means their ſucceſs will be but little dubious.

In doing this work it will be neceſſary to take the opportunity of cloudy moiſt weather, as the bud and ſtock will more readily unite, being more replete with juices than in hot dry weather, when the ſtock will perſpire ſo faſt as to leave the buds deſtitute of moiſture.

INORDINATE Proportion is where there are three magnitudes in one rank, and three others proportional to them in another, and you compare them in a different order. Thus, ſuppoſe the numbers in one rank to be 2, 3, 9; and thoſe of the other rank 8, 24, 36; which are compared in a different order, viz. 2 : 3 :: 24 : 36; and 3 : 9 :: 8 : 24. Then rejecting the mean terms of each rank, you conclude 2 : 9 :: 8 : 36.

INOSCULATION, in anatomy, the ſame with anaſtomaſis. See Anastomasis.

INQUEST, in law, ſignifies an enquiry made by a jury, in a civil or criminal cauſe, by examining witneſſes. See the article Jury.

INQUIRENDO, in law, an authority given to one or more perſons, to enquire into ſomething for the advantage of the king.

INQUISITION, in law, a manner of proceeding by way of ſearch or examination uſed on the king's behalf, in caſes of out-lawry, treaſon, felony, ſelf-murder, &c. to diſcover lands, goods, and the like, forfeited to the crown.

Inquisition, in the church of Rome, a tribunal in ſeveral Roman-catholic countries, erected by the popes for the examination and puniſhment of heretics.

INQUISITORS, in law, perſons who have power by their office to make inquiry into certain caſes; as ſheriffs, and coroners on view of the body.

INROLLMENT, in law, is regiſtering any lawful act, as a ſtatute or recognizance acknowledged, a deed of bargain and ſale, &c. in the rolls of chancery, king's bench, common pleas, or exchequer, at the huſtings of Guildhall, London, or at the quarter-ſeſſions.

INSCONSED, in the military art, part of an army that have fortified themſelves with a ſconce or ſmall fort, in order to defend ſome paſs, &c.

INSCRIBED, in geometry. A figure is ſaid to be inſcribed in another, when all its angles touch the ſides or planes of the other figure. See Hexagon, Pentagon, &c.

INSCRIPTION, a title or writing carved, engraved, or affixed to any thing, to give a more diſtinct knowledge of it, or to tranſmit ſome important truth to poſterity.

INSECTS, *Inſecta*, in natural hiſtory, a ſmaller kind of animals, that commonly are exſanguinous.

The word is Latin, and derived from *in*, and *ſeco*, to cut, becauſe in ſome inſects, as ants, the body ſeems divided into two; or becauſe the bodies of ſeveral of them, as worms, &c. conſiſt of divers rings, which are a ſort of inciſure.

As to the generation of inſects, the world is now generally convinced that they are not bred of corruption, but *ex ovo*, though the contrary was believed by the ancients.

Malpighi, Swammerdam, and Redi, have abundantly confuted the doctrine of equivocal generation, as well as the chimerical transformation of the caterpillar into the butterfly; and have ſhewn, that all the members of the butterfly were incloſed under the nympha or ſkin of the caterpillar, as the parts of a plant are in the ſeed.

Inſects take particular care to depoſit their eggs or ſemen in ſuch places where they may have a ſufficient incubation, and where the young, when hatched, may have proper food till they can ſhift for themſelves. Thoſe whoſe food is in the water, lay their eggs there: thoſe to whom fleſh is a proper food, in fleſh; and thoſe to whom the fruits or leaves of vegetables are food, are accordingly depoſited there, but conſtantly the ſame kind in the ſame tree. As for others that require a greater degree of warmth, they are provided by the parent with ſome place in or about the body of other animals, as the feathers of birds, hair of beaſts, ſcales of fiſh, in the noſe; in the fleſh, nay ſome in the bowels of man, and other creatures. And as for others, they make them neſts, by digging into the earth, wood, &c. carrying in and ſealing up proviſions that ſerve for the production of their young, and for their food when produced.

There is obſerved in flies, butterflies, &c. a kind of glue, by which the female faſtens her eggs to the bearing buds of trees, &c. ſo as not to be hurt by rain or froſt.

Mr. Andry, in his Treatiſe *de la generation des vers dans le corps de l'homme*, takes notice, that the ancients were miſtaken in denying that inſects breathed, on account of their wanting lungs; for modern obſervations convince us, that inſects have a greater number of lungs than any other animals; they alſo thought that they had no blood, as many of them had no red liquor like ours; but it is not the colour, but the uſe of the liquor, that is to be regarded. They alſo believed that they had no hearts; whereas our microſcopes now diſcover that, when inſects have ſeveral lungs, they have alſo ſeveral hearts; and this in particular is obſervable in ſilk-worms, who have a continued chain of hearts from the head almoſt to the extremity of the tail; and, as is apparent from ſeveral inſects, who give ſigns of life, long after they are divided into ſeveral parts.

Inſects want no parts that are either neceſſary or convenient for their uſe, or to render them complete in their kind. Some affirm that earth worms, and thoſe round-tailed worms, which are found in the inteſtines of men, horſes, &c. as alſo ſnails and horſe-leeches, are hermaphrodites; but that ſuch worms as become flies, and that ſilk-worms, are not ſo, being of no ſex, but neſts full of real animals, which in time come out with wings.

INSIDIANT Diseases, thoſe which ſhew no ſymptom, but lie concealed in the body, ready to break forth on the leaſt provocation, as it were by ſurprize.

INSITION, in gardening, the ſame with grafting. See Grafting.

INSOLATION, in chemiſtry, the ſuffering matters to ſtand and digeſt in the heat of the ſun, inſtead of that of a furnace. See the articles Fire and Heat.

INSOLVENT, a term applied to perſons unable to pay their debts. See the articles Debt and Debtor.

INSPIRATION, *Inſpiratio*, the conveying certain ſupernatural notices to the ſoul. This is ſuch an overpowering impreſſion made of any propoſition upon the mind by God himſelf, as gives an indubitable evidence of the truth and divinity of it.

Inspiration, in phyſic, that part of reſpiration whereby the air is drawn into the lungs, and ſtands contradiſtinguiſhed from expiration.

This admiſſion of the air depends immediately on its elaſticity, when the cavity of the breaſt is enlarged by the elevation of the thorax and abdomen, and particularly by the motion of the diaphragm downwards. This dilatation of the breaſt does not draw in the air, though it be a condition abſolutely neceſſary to inſpiration, but it is an actual intruſion of the air into the lungs.

INSPISSATING, Inspissation, or Condensation, in pharmacy, the reducing a liquor to a thicker conſiſtence by evaporating the thinner parts. See Incrassating.

INSTALLMENT, the inſtating a perſon in any dignity.

The word is derived from the Latin *inſtallo*, which is compounded of *in*, and *ſtallum*, a ſeat in a church, bench in a court of juſtice, &c.

It chiefly denotes the induction of a dean, prebendary, or other eccleſiaſtical dignitary, into the poſſeſſion of his proper ſeat in a cathedral church. This is ſometimes called inſtallation.

Installment likewiſe denotes the ceremony, whereby the knights of the garter are placed in their rank in the chapel of St. George at Windſor.

INSTANT, ſuch a part of duration wherein we perceive no ſucceſſion, or it is that which takes up the time of an idea in our minds.

The ſchoolmen diſtinguiſh three kinds of inſtants; a temporary, a natural, and a rational inſtant.

Temporary inſtant is a part of time immediately preceding another: thus the laſt inſtant of a day precedes, immediately and really, the firſt inſtant of the following day.

Natural inſtant is what we otherwiſe call a priority of nature, which obtains in things that are ſubordinated in acting, as firſt and ſecond cauſes, or cauſes and their effects: for the nature of things requires, that if there be a ſecond cauſe there muſt be a firſt; and that there muſt be a cauſe, if there be an effect. See Cause.

Rational inſtant is not any real inſtant, but a point which the underſtanding conceives to have been before ſome other inſtant, founded on the nature of the thing which occaſioned it to be conceived: for inſtance, if God made ſeveral things voluntarily, which he could otherwiſe have let alone, there is a reaſonable foundation to conceive God ſuch as he is in himſelf, before he had made any of theſe voluntary determinations: but as there was no real inſtant when God had not formed any determination, this inſtant is called a rational inſtant, by way of oppoſition to an inſtant of time.

INSTAURATION, the re-eſtabliſhment or reſtauration of a religion, a church, or the like, to its former ſtate.

INSTEP, in the manege, is that part of a horſe's hind leg which reaches from the ham to the paſtern joint; and which, when the horſe is in his natural poſture of ſtanding, ſhould be large, flat, and in a perpendicular line with the ground: for when the inſteps do not ſtand perpendicularly, it is a certain ſign of weakneſs either in the reins or hinder quarters.

INSTINCT, an appellation given to the ſagacity and natural inclinations of brutes, which ſupplies the place of reaſon in mankind. See the articles Reason and Brute.

INSTITUTES, in literary hiſtory, a book containing the elements of the Roman law, and conſtitutes the laſt part of the civil law. See the article Civil Law.

INSTITUTION, in general, ſignifies the eſtabliſhing or founding ſomething.

INSTRUMENT, in general, whatever is ſubſervient to a cauſe in producing any effect.

A common caſe of mathematical inſtruments contains ſeveral compaſſes, a ſector, ſcale, drawing-pen, and protractor. See the articles Compasses, Secter, Scale, &c.

Instrument, in law, ſome public act, or authentic deed, by which any truth is made apparent, or any right or title eſtabliſhed in a court of juſtice. See the article Deed.

INSULATED, *Inſulatus*, in architecture, an appellation given to ſuch columns as ſtand alone, or free from any contiguous wall, &c. like an iſland in the ſea, whence its name.

INSULT, *inſultus*, in medicine, ſignifies the acceſs of the paroxyſm of intermitting diſeaſes.

Insult, in the art of war, the ſame with aſſault. See Assault.

INSURANCE, or Assurance, a contract or ſecurity, which is commonly called policy, given by one or more perſons, whereby they oblige themſelves, in conſideration of a ſum of money paid down, to make good ſhips, merchandizes, houſes, &c. to the value of that for which the premium is received, in caſe of loſs by ſtorm, pirates, fire, &c.

We have in London ſeveral offices of inſurance from fire, which are erected into corporations, as the Royal Exchange aſſurance, the Sun-fire-office, the Hand-in-Hand fire-office, the London-aſſurance, the Phœnix-office, &c. ſome for houſes, others for goods, and ſome for both.

There are alſo offices wherein private merchants grant inſurances for ſhips, and theſe are called inſurance brokers.

We have alſo aſſurances for life, by virtue of which, when the perſon aſſured dies, a ſum of money, according as he inſured, becomes payable to the perſon in favour of whom the policy of aſſurance was granted. See the article Policy *of Aſſurance.*

INTACTÆ, in conics, an appellation ſometimes given to the aſymptotes. See the article Asymptotes.

INTAGLIOS, precious ſtones on which are engraved the heads of great men, inſcriptions, and the like, ſuch as we frequently ſee ſet in rings, ſeals, &c.

INTEGER, in arithmetic, a whole number, in contradiſtinction to a fraction. See Number and Fraction.

INTEGRAL, or Integrant, in the ſchools, denotes thoſe parts which are neceſſary to the integrity of any whole, and ſo ſtand contradiſtinguiſhed from eſſential parts. The arms, &c. are integral parts of a man; body and ſoul are eſſential parts.

Integral *Calculus*, in the new analyſis, is the counter part to the differential calculus. The latter hath been fully explained by M. l'Hoſpital; but the former hath been but little cultivated.

The integral calculus of Leibnitz and others anſwers to the inverſe method of fluxions among the Engliſh.

INTENDMENT, in law, is the intention, deſign, or true meaning of a perſon or thing, which frequently ſupplies what is not fully expreſſed: but though the intent of parties in deeds and contracts is much regarded by the law, yet it cannot take place againſt the rules of law.

Intendment *of Crimes*; this in caſe of treaſon, where the intention is proved by circumſtances, is puniſhable in the ſame manner as if it was put in execution.

INTERCALARY Day, in chronology, the odd day inſerted in a leap-year. See the article Biſſextile.

The word is Latin, *intercalaris*, and derived from *inter*, and *calo*, which anciently ſignified to call with a loud voice: an intercalary day among the Romans, ſignifying a day inſerted between two other days, which for that reaſon was proclaimed by the prieſts with a loud voice.

INTERCEPTED Axis, in conic ſections, the ſame with abſciſs. See Absciss.

INTERCOLUMNIATION, in architecture, implies the ſpace between two columns, which is always to be proportioned to the height and bulk of the columns.

INTERCOMMONING, in law, is when the commons of two manors lie together, and the inhabitants of both have, time out of mind, cauſed their cattle to feed promiſcuouſly on them.

INTERCOSTAL, in anatomy, an appellation given to ſuch muſcles, nerves, arteries, and veins, as lie between the ribs. See Rib.

INTERDICT, an eccleſiaſtical cenſure, by which the church of Rome forbids the performance of divine ſervice in a kingdom, province, town, &c.

INTEREST, a ſum of money which is reckoned for the loan and forbearance of ſome other ſum lent for, or due at, a certain time, according to a certain rate in the hundred pounds. The ſum lent or forborn is called the principal, becauſe it produces the intereſt, or from which the intereſt is reckoned. Intereſt is either ſimple or compound.

Simple Interest is that which is paid for the loan of any principal or ſum of money lent out for ſome time at any rate, per cent. agreed on between the borrower and the lender; which, according to the laws of England, ought to be but 5 *l.* for the uſe of 100 *l.* for one year, and 10 *l.* for the uſe of 100 *l.* for two years; and ſo on for a greater or leſs ſum, proportionable to the time propoſed.

There are ſeveral ways of computing or anſwering queſtions about ſimple intereſt; as by the ſingle and double rule of three; others make uſe of tables compoſed of ſeveral rates per cent.

But we ſhall ſhew, that all computations relating to ſimple intereſt, are grounded upon arithmetical progreſſion; and from thence raiſe ſuch general theorems as will ſuit with all caſes. In order to that,

Let $P =$ any principal or ſum put to intereſt.
$R =$ the ratio of the rate per cent. per annum.
$t =$ the time of the principal's continuing at intereſt.
$A =$ the amount of the principal and its intereſt.

Note. The ratio of the rate is only the ſimple intereſt of 1 *l.* for one year, at any given rate; and it is found thus: viz.

100 : 5 : : 1 : 0.05 = the rate at 5 per cent. per annum.

100 : 6 : : 1 : 0.06 = the rate at 6 per cent. &c.

Again, 100 : 6.5 : : 1 : 0.065 = the ratio 6 and $\frac{1}{2}$ per cent.

And if the given time be whole years, then t = the number of thoſe years: but if the time given be either pure parts of a year, or parts of a year mixed with years, thoſe parts muſt be turned into decimals; and then t = thoſe decimals, &c.

Now the common parts of a year may be eaſily turned or converted into decimal parts, if it be conſidered that

one { day is the $\frac{1}{365}$ part of a year = 0.00274,
month is the $\frac{1}{12}$ part of a year = 0.08333,
quarter is the $\frac{1}{4}$ part of a year = 0.25,
half a year = 0.5, and three quarters = 0.75.

Theſe things being premiſed, we may proceed to raiſing the theorems:

Let R = the intereſt of 1 *l.* for one year, as before; then 2 R = the intereſt of 1 *l.* for two years, and 3 R = the intereſt of 1 *l.* for three years, 4 R = the intereſt of 1 *l.* for four years; and ſo on for any number of years propoſed.

Hence it is plain, that the ſimple intereſt of 1 *l.* is a ſeries of terms in arithmetical progreſſion increaſing, whoſe firſt term and common difference is R, and the number of all the terms is t; therefore the laſt term will always be tR = the intereſt of 1 *l.* for any given time ſignified by t.

Then { As 1 *l.* is to the intereſt of 1 *l.* ſo is any principal, or given ſum, to its intereſt.

That is, 1 *l.* : tR : : P : tRP = the intereſt of P. Then the principal being added to its intereſt, their ſum will be = A, the amount required: which gives this general theorem:

Theorem $tRP+P=A$.

From whence the three following theorems are eaſily deduced:

Theorem 2. $\frac{A}{tR+1}=P$.

Theorem 3. $\frac{A-P}{tP}=R$.

Theorem 4. $\frac{A-P}{RP}=t$.

Theſe four theorems reſolve all queſtions about ſimple intereſt. Thus, if it were to be required to find what 256 *l.* 10 *s.* will amount to in three years, one quarter, two months, and eighteen days, at 6 per cent. per annum.

Here is given P = 256.5, R = 0.06, and t = 3.46599. Quere A, per theorem 1.

For three years = 3.
One quarter = 0.25
Two months = 0.16667 = 0.08333 × 2
Eighteen days = $\underline{0.04932}$ = 0.00274 × 18

Hence t = 3.46599 : × 0.06 = 0.2079594 = tR.

Then 0.207594 × 256.5 = 53.341586 = tRP.

And 53.341586 + 256 5 = 309.841586 = tRP + P = A.

That is, 309 841586 = 309 *l.* 16 *s.* 10 *d.* being the anſwer required.

And thus may all queſtions, relating to ſimple intereſt, be reſolved, due regard being had to the theorem relating to the queſtion.

Annuities, or penſions in arrears, may be computed by ſimple intereſt, as follows:

When annuities, payable yearly, half yearly, &c. are not paid as they become due, ſuch annuities are ſaid to be in arrears; and, therefore, to find the value of an annuity in arrears, we muſt calculate what all thoſe payments will amount to, allowing any rate of ſimple intereſt for their forbearance, from the time each particular payment became due. In order to this, put u = the annuity, t = the time it has continued unpaid, R = the ratio, or intereſt for 1 *l.* for one year, and A = the amount of the annuity and its intereſt.

Then if u = the firſt year's rent due with intereſt, Ru will = the intereſt, and 2u = the rent due at the end of the ſecond year; and, conſequently, 2Ru = the intereſt, and 3u = the rent due at the end of the third year; and 3Ru = the intereſt, and 4u = the rent due at the end of the fourth year: and ſo on for any number of years.

Hence it is evident, that $Ru+2Ru+3Ru+4Ru+5u=A$, the ſum of all their rents and intereſts being forborn five years: from whence it follows, that $Ru+2Ru+3Ru+4Ru=A-tu$. Here $t=5$. Divide the equation by u, and we have $R+2R+3R+4R=\frac{A-tu}{u}$. In order to find the ſum of this progreſſion, put $z=R+2R+3R+4R$, &c. Then $1+2+3+4$, &c. $=\frac{z}{R}$. Here the ſum of the firſt and laſt terms is $4+1=5=t$. And the number of all the terms is $4=t-1$; therefore $\frac{t-1}{2}\times t=$ the ſum of all the terms. That is, $\frac{tt-t}{2}=\frac{Z}{R}$. Hence $\frac{ttR-tR}{2}=z$. Conſequently $\frac{ttR-tR}{2}=\frac{A-tu}{u}$.

From this equation the three following theorems are eaſily and naturally deduced:

Theorem 1. $\frac{ttRu-tRu+2tu}{2}=A$. Or $\frac{ttu-tu}{2}\times R:+tu=A$.

Theorem 2. $\frac{2A}{ttR+tR+2t}=u$.

Theorem 3. $\frac{2A-2tu}{ttu-tu}=R$. Let $\frac{2}{R}=x+1$. Then $t=\sqrt{\frac{2A}{Ru}+\frac{xx}{4}}-\frac{1}{2}x$. Theorem 4.

By the help of theſe four theorems, all queſtions of this nature may be eaſily ſolved. Thus, for example : ſup-

Suppoſe 250 *l.* yearly annuity, be forborn or unpaid ſeven years, what will it amount to in that time at 6 per cent. for each payment as it becomes due ?

Here $u = 250$, $t = 7$, and $R = 0{,}06$, are given, to find A; which is eaſily performed by theorem 1. For, firſt $250 \times 7 = 1750 = tu$; and $1750 \times 7 = 12250 = ttu$. Again, $12250 - 1750 = 10500 = ttu - tu$. And $\frac{10500}{2} \times 0{,}06 = 315$. Laſtly, $315 + 1750 = A = 2065$ *l.* the anſwer required.

Having ſhewn the method of finding the value of annuities in arrears, we ſhall proceed to explain the manner of finding the preſent worth of annuities, computed at ſimple intereſt.

The whole buſineſs of purchaſing annuities, or taking of leaſes, &c. for any aſſigned time, depends upon the purchaſe, with the annuity or yearly rent, by allowing the ſame rate of intereſt to both parties, which may be eaſily performed by carefully attending to what has been already ſaid. For example, What is 75 *l.* yearly rent, to continue nine years, worth in ready money at 6 per cent. per annum, ſimple intereſt?

Firſt, by theorem 1, find what the propoſed yearly rent would amount to, if it were forborn nine years at 6 per cent. which by the ſaid theorem will amount to $837 = A$.

Then find what principle, being put out to intereſt for the ſame time, and at the ſame rate, will amount to 837*l.* $= A$.

Thus $tR = 0.54 = 9 \times 0.06$, $tR + 1 = 1.54$, by which divide 837, and we have $543.5064 =$ 543*l.* 10*s.* 1½*d.* the preſent worth of the annuity required.

Compound INTEREST, is that which ariſes from any principal and its intereſt put together, as the intereſt ſtill becomes due; ſo that at every payment, or at the time when the payments become due, there is created a new principal; and for that reaſon it is called intereſt upon intereſt, or compound intereſt.

As for inſtance, ſuppoſe 100 *l.* were lent out for two years, at 6 per cent. per annum, compound intereſt; then at the end of the firſt year, it will only amount to 106 *l.* as in ſimple intereſt; but for the ſecond year this 106 *l.* becomes principal, which will amount to 112 *l.* 7 *s.* 2½ *d.* at the ſecond year's end; whereas by ſimple intereſt it would have amounted to but 112 *l.* And although it be not lawful to let out money at compound intereſt, yet in purchaſing annuities or penſions, &c. and taking leaſes in reverſion, it is very uſual to allow compound intereſt to the purchaſer for his ready money, and therefore it is very requiſite to underſtand it.

Let R be the amount of one pound in one year, viz. principal and intereſt; P any ſum put out at intereſt for any number n of years, a its amount, A any annuity forborn n years, m its amount, and v its worth in preſent money, for the ſame time.

Therefore, ſince one pound put out at intereſt, in the firſt year is increaſed to R, it will be as 1 to R, ſo is R, the ſum forborn the ſecond year, to R^2, the amount of one pound in two years; and therefore, as 1 to R, ſo is R^2, the ſum forborn the third year, to R^3, the amount in three years; whence it appears, that R^n, or R, raiſed to the power whoſe exponent is the number of years, will be the amount of one pound in thoſe years; but as 1 *l.* to its amount R^n, ſo is P to a, its amount in the ſame time; whence we have $P \times R^n = a$. And becauſe the amount of one pound in n years is R^n, its increaſe in that time will be $R^n - 1$; but its intereſt for one ſingle year, or the annuity anſwering to that increaſe, is $R - 1$; therefore, as $R - 1$ to $R^n - 1$, ſo is A to m. Hence we get $\frac{A \times R^n - 1}{R - 1} = m$. But as it appears that one pound, ready money, is equivalent to R^n, to be received at the expiration of n years, we have, as R^n to 1, ſo is $\frac{A \times R^n - 1}{R - 1}$ (the ſum in arrear) to v, its preſent worth in ready money; whence $\frac{A \times 1 - R^{\frac{1}{n}}}{R - 1} = v$. From theſe theorems, the various queſtions relating to compound intereſt, annuities in arrears, and purchaſing of annuities, are reſpectively reſolved.

Several ingenious mathematicians, as Dr. Halley, De Moivre, Simpſon, &c. have explained the method of computing the expectation or eſtimate of life; we ſhall therefore here ſubjoin, a curious and uſeful table, that ſhews the value of annuities for every fifth year of age to the 75th, at 3, 4, and 5 per cent. as given by the laſt mentioned gentleman, in his Doctrine of Annuities upon Lives.

Age	Year's purchaſe at 5 per cent.	Year's purchaſe at 4 per cent.	Year's purchaſe at 3 per cent.
6	14.1	16.2	18.8
10	14.3	16.4	19.0
15	13.9	15.8	18.3
20	13.0	14.8	17.2
25	12.3	14.0	16.1
30	11.6	13.1	15.0
35	10.9	12.3	14.1
40	10.3	11.5	13.2
45	9.8	10.8	12.3
50	9.2	10.1	11.4
55	8.5	9.3	10.3
60	7.9	8.4	9.2
65	7.1	7.5	8.0
70	6.2	6.5	6.9
75	5.2	5.4	5.6

Interest, in law, is generally taken for a chattel real, or a leaſe for years, &c. but more for a future term.

INTERJECTION, in grammar, an indeclinable part of ſpeech, ſignifying ſome paſſion or emotion of the mind.

As the greateſt part of the expreſſions uſed on theſe occaſions are taken from nature alone, the real interjections in moſt languages, are monoſyllables; and as all nations agree in theſe natural paſſions, ſo do they agree in the ſigns and indications of them, as of love, mirth, &c.

The Greeks confound their interjections with adverbs, and the Hebrews confound them with their adverbs and prepoſitions, calling them all by the general name particle.

INTERIM, a name given to a formulary, or kind of confeſſion to the articles of faith, obtruded upon the proteſtants after Luther's death by the emperor Charles V. when he had defeated their forces; ſo called becauſe it was only to take place in the interim, mean time, till a general council ſhould have decided all points in diſpute between the proteſtants and the Romaniſts.

INTERLOCUTORY Order, in law, an order that does not decide the cauſe, but only ſome matter incident thereto, which happens between the beginning and end of a cauſe; as when in chancery or exchequer, the plaintiff obtains an order for an injunction until the hearing of the cauſe; which order, not being final, is called interlocutory.

INTERLUDE, an entertainment exhibited on the theatre between the acts of the play, to amuſe the ſpectators while the actors ſhift their dreſs, or to give time of changing the ſcenes and decorations.

INTERMITTENT, or Intermitting Fevers, ſuch fevers as go off and ſoon return again, in oppoſition to thoſe which are continual. See the article *Intermitting* Fever.

INTERNAL, in general, denotes whatever is within a thing.

INTERNODIUM, among botaniſts, implies the ſpace between two knots or joints of the ſtalks of barley, oats, and the like plants.

INTEROSSEUS, in anatomy, an appellation given to the muſcles which move the fingers and toes, from their being ſituated between the bones of thoſe parts. See the articles Muscle, Flexor, &c.

INTERPRETATION, among critics, denotes a ſpurious paſſage, inſerted into the writings of ſome ancient author.

INTERPRETER, in general, denotes a perſon who explains the words or writings of another, ſo as to make them intelligible to thoſe who did not underſtand them before.

INTERREGNUM, the time during which the throne is vacant, in elective kingdoms; for in ſuch as are hereditary, like ours, there is no ſuch thing as an interregnum.

INTERREX, the magiſtrate who governs during an interregnum.

INTERROGATION, or *Point of* Interrogation, in grammar, a character of this form (?) ſerving to denote a queſtion.

Interrogation, in rhetoric, is a figure, whereby the orator propoſes ſomething by way of queſtion; which, it muſt be owned, greatly enlivens the diſcourſe.

INTERROGATORIES, in law, are queſtions wrote down, and demanded of the witneſſes examined in a cauſe, more eſpecially in the court of chancery.

INTERRUPTION denotes the ſame thing with disjunction in proportion, and is noted thus (: :) ſignifying the breaking of the ratio in the middle of four diſcrete proportionals, as A : B : : C : D; that is, as A to B, ſo is C to D.

Interruption, in rhetoric, when a perſon breaks off his diſcourſe ſuddenly to ſhew ſome paſſion.

INTERSECTION, in mathematics, the cutting of a line or plane by another, or the point or line wherein two lines, or two planes, cut each other.

The word is derived from the Latin *inter*, and *ſeco*, to cut.

The mutual interſection of two planes in a right line. The center of a circle is in the interſection of two diameters, &c. The equinoxes happen, when the ſun is in the interſections of the equator and ecliptic.

INTERSPINALES *Colli*, in anatomy, ſmall fleſhy muſcles of the neck, ariſing from the ſuperior parts of each double ſpinal proceſs of the neck, except of the ſecond vertebra; and inſerted into the inferior parts of all the double ſpines. When theſe muſcles act, they draw the ſpines of the vertebra of the neck nearer each other.

INTERSTELLAR, a word uſed by ſome authors to expreſs thoſe parts of the univerſe that are without and beyond our ſolar ſyſtem.

INTERTIES, in architecture, thoſe ſmall pieces of timber that lie horizontally between the ſommers, or between them and the ſell, or reſon.

INTERTRANSVERSALES *Colli*, in anatomy, certain muſcles ſituated among the tranſverſe apophyſes of the vertebræ: they ariſe from the lower vertebra, and are inſerted into that next above: they are of the ſame ſize and figure with the interſpinales.

INTERVAL, in muſic, the difference between two ſounds, in reſpect of acute and grave; or, that imaginary ſpace terminated by two ſounds, differing in acuteneſs or gravity.

Intervals, in gardening and huſbandry, the ſpaces left between the ſeveral rows of plants ſown or ſet in gardens or fields. See Husbandry.

INTESTATE, in law, a perſon that dies without making a will; in which caſe, a diſtribution of his perſonal eſtate, after his debts and funeral charges are paid, is to be made among the wife and children of the deceaſed, or for want of ſuch, among the next of kin.

INTESTINES, in anatomy, long, cylindrical, hollow, and membranaceous bodies; or rather, one ſuch continued body, or tube, reaching from the ſtomach to the anus.

The ſtructure and ſubſtance of the inteſtines are membranaceous; being formed, in every part, of five coats or tunics. The firſt is the common coat, from the peritonæum, and is membranaceous. The ſecond is cellular, and is called by late writers, tunica celluloſa Ruyſchii: it is contiguous with the meſentery, and is to be diſcovered by inflating it; this coat, in fat animals, frequently contains abunnance of fat. The third is muſcular; it is compoſed of a double ſeries of fibres, in part longitudinal, and in part annular; and theſe aſſiſt the motion of the guts. The fourth coat is nervous: it is furniſhed with abundance of cellules, vaſcules, and glands, and is thicker than the others: from this ariſe the rugæ, and the valves of the inteſtines. The fifth is the villoſe coat, which ſuſtains the terminations of the excretory veſſels, and the beginnings of the lacteals: hence, when nicely examined, it has the appearance of a ſieve: it is the organ of percolation of the chyle.

The inteſtines have veſſels in great abundance. Their arteries are from the meſeraic ones: the upper meſeraic ſerving for the ſmaller inteſtines, the lower for the larger; and theſe make a multitude of very ſingular and ſurprizing anaſtomoſes. The veins are meſeraics, and go off to the vena portæ and the liver. The nerves are ſent from the intercoſtals, and the par vagum. And beſides theſe we are to obſerve the lacteal veſſels. See the article LACTEAL.

The rectum, it is to be obſerved, receives blood-veſſels alſo from the hypogaſtrics. There are alſo, beſides the Brunnerian glands of the duodenum, other glands in the inteſtines, called from the name of the perſon who diſcovered them, glandulæ Peyeri. Theſe, in the ſmall guts, are uſually little, congregate, and miliary; but ſometimes they are ſingle. They are larger as they are nearer to the duodenum, and ſmaller as they approach towards the great guts. Their office is to diſcharge into the inteſtines a liquor, which ſerves for the attenuation of the chyle, and for the lubricating of the inteſtines. In the larger guts, and in the vermiform appendage, they are ſingle and large, of a lenticular figure; and they are largeſt of all in the rectum. They have mouths, out of which there is ſecreted a fluid, which ſerves to lubricate the ſides of the inteſtines, and to ſoften the fæces, that they may be evacuated without pain.

The uſe of the ſmaller guts is to promote the formation of the chyle, to perfect its ſecretions, and to propel the remaining fæces to the larger. The office of the larger guts is to receive and collect the matter of the fæces, at a proper time to expel it. See CHYLE.

INTESTINAL, ſomething belonging to, or ſeated in the inteſtines.

INTRADA, ENTRY, in the Italian muſic, is much the ſame with prelude or overture.

INTRENCHMENT, or RETRENCHMENT, in the art of war. See the article RETRENCHMENT.

INTRIGUE, or INTREAGUE, an aſſemblage of events or circumſtances, occurring in an affair, and perplexing the perſons concerned in it.

In this ſenſe, it uſed to ſignify the nodus or plot of a play or romance; or that point wherein the principal characters are moſt embarraſſed, through the artifice and oppoſition of certain perſons, or the unfortunate falling out of certain accidents and circumſtances.

In tragedy, or an epic poem, there are always two deſigns; the firſt and principal is that of the hero of the piece. The ſecond contains the deſigns of all thoſe who oppoſe him: theſe oppoſite cauſes produce oppoſite effects; to wit, the efforts of the hero for the execution of his deſign, and the efforts of thoſe who thwart it. As thoſe cauſes and deſigns are the beginning of the action, ſo theſe efforts are the middle, and there form a knot or difficulty which we call the intrigue, that makes the greateſt part of the poem. It laſts as long as the mind of the reader or hearer is ſuſpended about the event of thoſe oppoſite efforts: the ſolution or cataſtrophe commences when the knot begins to unravel, and the difficulties and doubts begin to clear up.

INTRINSIC, a term applied to the inner, real, and genuine values, properties, &c. of any thing, in oppoſition to their extrinſic or apparent values, &c.

INTRUSION, in law, obtains where an anceſtor dies ſeiſed of an eſtate or inheritance, which is expectant upon an eſtate for life, and the tenant for life dies; after which a ſtranger enters before the heir, in which caſe he is ſaid to intrude.

INTUITION, among logicians, the act whereby the mind perceives the agreement or diſagreement of two ideas, immediately by themſelves, without the intervention of any other; in which caſe, the mind perceives the truth as the eye doth the light, only by being directed towards it. Thus the mind perceives that white is not black, that three are more than two, and equal to one and two. See IDEA.

This part of knowledge, ſays Mr. Locke, is irreſiſtible, and, like the ſun-ſhine, forces itſelf immediately to be perceived as ſoon as ever the mind turns its view that way. It is on this intuition that all the certainty and evidence of our other knowledge depends; this certainty every one finds to be ſo great, that he cannot imagine, and therefore cannot require, a greater. See the articles Judgment, Knowledge, Demonstration, &c.

INVALID, a perſon wounded, maimed, or diſabled for action by age, &c.

INVECTED, in heraldry, denotes a thing fluted or furrowed.

INVECTIVE, in rhetoric, differs from reproof, as the latter proceeds from a friend, and is intended for the good of the perſon reproved; whereas the invective is the work of an enemy, and entirely deſigned to vex and give uneaſineſs to the perſon againſt whom it was directed.

INVENTION denotes the act of finding any thing new, or even the thing thus found.

Invention, in rhetoric, being one of the ſecond diviſions of invention, according to Bacon, ſignifies the finding out and chooſing of arguments which the orator is to uſe for proving his point, or moving his hearers paſſions.

Invention, in poetry, is applied to whatever the poet adds to the hiſtory of the ſubject he has choſen, as well as to the new turn he gives it.

Invention, in painting, is the choice which the painter makes of the objects that are to enter the compoſition of his piece.

INVENTORY, in law, &c. is a ſchedule containing all the goods and chattels of a deceaſed perſon that belonged to him at the time of his death, together with the value of the ſame, as appraiſed by two or more indifferent perſons.

INVERSE is applied to a manner of working the rule of three, or proportion, which ſeems to go backward, or contrary to the order of the common or direct rule. See the articles Rule *of Three* and Proportion.

INVERSION, in grammar, is where the words of a phraſe are ranged in a manner not ſo natural as they might be.

It is a conſiderable beauty either in verſe or proſe, when we have it from an able hand; it gives vigour and variety to a ſentence, and keeps the mind in an agreeable ſuſpence and expectation of a marvellous turn and concluſion.

INVESTIGATION properly denotes the finding any thing out by the prints of the feet.

Mathematicians, &c. have hence applied the word to the reſpective reſearches in which they are employed.

Investigation *of a Theme*, in grammar, the finding out the primitive ſenſe, mood, and perſon of any verb that is remote from its ſource.

It is abſolutely neceſſary to be acquainted with this method of inveſtigation, in order to underſtand a Greek author.

Clenard was the firſt who introduced the term into grammar.

INVESTITURE, in law, a giving livery of ſeiſin or poſſeſſion.

INULA, in botany, a genus of plants whoſe flower is compounded and radiated; the corollæ which compoſe the diſc are very numerous, hermaphrodite, and infundibuliform; the female flowers form the rays, and are ligulated and linear; there is no pericarpium, but the cup, which is immutable, contains ſolitary, quadrangular, linear ſeeds, placed on a plane naked receptacle.

To this genus belongs the elecampane. See the article Elecampane.

INVOCATION, in theology, the act of adoring God, and eſpecially of addreſſing him in prayer for his aſſiſtance and protection.

Invocation, in poetry, an addreſs at the beginning of a poem, wherein the poet calls for aſſiſtance of ſome divinity, particularly of his muſe, or the deity of poetry.

INVOICE, an account in writing of the particulars of merchandize, with their value, cuſtom, charges, &c. tranſmitted by one merchant to another in a diſtant country.

One copy of every invoice is to be inſerted verbatim in the invoice-book, for the merchant's private uſe; and another copy muſt, immediately upon ſhipping off the goods, be diſpatched by poſt, or otherwiſe, to the correſpondent. This copy is commonly drawn out upon a ſheet of large poſt-paper, to the end of which is ſubjoined a letter of advice.

Invoice-Book. This book is paged, and contains copies of the invoices of goods ſent to ſea: for as a merchant is obliged to ſend his correſpondent an invoice of all the goods he conſigns to him, ſo it is reaſonable that he ſhould keep a copy of it for himſelf.

INVOLUCRUM, among botaniſts, a kind of calyx placed at the foot of an umbel at a diſtance from the flower, by the length of the footſtalk ſurrounding a number of flowers, each of which having, beſides this general cup, its own particular perianthium. An involucrum is either univerſal or partial, and is generally diſpoſed in a radiated form.

INVOLUTION, in algebra, the raiſing any quantity from its root to any height or power aſſigned.

The quantity a^m expreſſes any power of a in general; the exponent (m) being undetermined; and a^{-m} expreſſes $a^{\frac{1}{m}}$, or a negative power of a of an equal exponent: and $a^m \times a^{-m} = a^{m-m} = a^0 = 1$ is their product, a^n expreſſes any other power of a; $a^m \times a^n = a^{m \times n}$ is the product of the powers a^m and a^n, and a^{m-n} is their quotient.

To raiſe any ſimple quantity to its 2d, 3d, or 4th power, is to add its exponent twice or four times to itſelf; therefore, the 2d power of any quantity is had by doubling its exponent, and the third by trebling its exponent; and in general, the power expreſſed by *m* of any quantity is had by multiplying the exponent by *m*, as is obvious from the multiplication of powers.

Thus, the 2d power or ſquare of *a* is $a^{2\times 1}=a^2$; its third power or cube is $a^{3\times 1}=a^3$; and the m^{th} power of *a* is $a^{m\times 1}=a^m$. Alſo the ſquare of a^4 is $a^{2\times 4}=a^8$; the cube of a^4 is $a^{3\times 4}=a^{12}$; and the m^{th} power of a^4 is $a^{4\times m}$. The ſquare of abc is $a^2b^2c^2$, the cube is $a^3b^3c^3$, the m^{th} power $a^m b^m c^m$.

The co-efficient muſt alſo be raiſed to the ſame power by a continual multiplication of itſelf, as often as an unit by itſelf, is contained in the exponent of the power required. Thus the cube of $3ab$ is $3\times 3\times 3\times a^3b^3=27a^3b^3$.

As to the ſigns when the quantity to be involved is poſitive, it is obvious that all its powers muſt be poſitive. And, when the quantity to be involved is negative, yet all its powers whoſe exponents are even numbers muſt be poſitive; for any number of multiplications of a negative, if the number is even, gives a poſitive.

The power then only can be negative, when its exponent is an odd number, though the quantity to be involved be negative.

The powers of $-a$ are $-a$, $+a^2$, $-a^3$, $+a^4$, $-a^5$, &c.

Thoſe whoſe exponents are 2, 4, 6, &c. are poſitive; but thoſe whoſe exponents are 1, 3, 5, &c. are negative.

The involution of compound quantities is a more difficult operation. The powers of any binomial $a+b$ are found by a continual multiplication of it by itſelf, as follows:

$$
\begin{array}{l}
\quad a+b=\text{the root.}\\
\times\ a+b\\ \hline
\quad a^2+ab\\
\qquad +ab+b^2\\ \hline
\quad a^2+2ab+b^2=\text{the ſquare, or 2d power.}\\
\times\ a+b\\ \hline
\quad a^3+2a^2b+ab^2\\
\qquad +a^2b+2ab^2+b^3\\ \hline
\quad a^3+3a^2b+3ab^2+b^3\\
\times\ a+b\\ \hline
\quad a^4+3a\ b+3a^2b^2+ab^3\\
\qquad +a^3b+3a^2b^2+3ab^3+b^4\\ \hline
\quad a^4+4a^3b+6a^2b^2+4ab^3+b^4=\text{the biquadrate}
\end{array}
$$

or 4th power.

If the powers of $a-b$ are required, they will be found the ſame as the preceding, only the terms in which the exponent of *b* is an odd number will be found negative; becauſe an odd number of multiplications of a negative produces a negative. Thus the cube of $a-b$ will be found to be $a^3-3a^2b+3ab^2-b^3$; where the 2d and 4th terms are negative, the exponent of *b* being an odd number in theſe terms. In general, the terms of any power of $a-b$ are poſitive and negative by turns.

If it be obſerved, that, in the firſt term of any power of $a\mp b$, the quantity *a* has the exponent of the power required; that, in the following terms, the exponents of *a* decreaſe gradually by the ſame difference (viz. an unit) and that in the laſt terms it is never found: the powers of *b* are in the contrary order; it is not found in the firſt term, but its exponent in the 2d term is an unit, in the 3d term its exponent is 2; and thus its exponent increaſes, till in the laſt term, it becomes equal to the exponent of the power required.

As the exponents of *a* thus decreaſe, and at the ſame time thoſe of *b* increaſe, the ſum of their exponents is always the ſame, and is equal to the exponent of the power required.

To find the co-efficient of any term, the co-efficient of the preceding term being known, you are to divide the co efficient of the preceding term by the exponent of *b* in the given term, and to multiply the quotient by the exponent of *a* in the ſame term, increaſed by an unit.

In general, if $a+b$ is to be raiſed to any power *m*, the terms, without their co-efficients, will be a^m, $a^{m-1}b$, $a^{m-2}b^2$, $a^{-3}b^3$, a^{m-4}, b^4, $a^{m-5}b^5$, &c. continued till the exponent of *b* becomes equal to *m*.

The co-efficients of the reſpective terms, according to the laſt rules, will be 1, *m*, $m\times\frac{m-1}{2}$, $m\times\frac{m-1}{2}\times\frac{m-2}{3}$ $m\times\frac{m-1}{2}\times\frac{m-2}{3}\times\frac{m-3}{4}$, $m\times\frac{m-1}{2}\times\frac{m-2}{3}\times\frac{m-3}{4}\times\frac{m-4}{5}$, &c. continued until you have one co-efficient more than there are units in *m*.

JOACHIMITES, in church hiſtory, the diſciples of Joachim, a Ciſtercian monk, who was an abbot of Flora in Calabria, and a great pretender to inſpiration.

JOB, or *Book of* Job, a canonical book of the Old Teſtament, containing a narrative of a ſeries of misfortunes which happened to a man whoſe name was Job, as a trial of his virtue and patience; together with the conferences he had with his cruel friends, on the ſubject of his misfortunes, and the manner in which he was reſtored to eaſe and happineſs. This book is filled with thoſe noble, bold and figurative expreſſions, which conſtitute the very ſoul of poetry.

Many of the Jewiſh rabbins pretend that this relation is altogether a fiction: others think it a ſimple narrative of a matter of fact, juſt as it happened; while a third ſort of critics acknowledge that the ground-work of the ſtory is true, but that it is wrote in a poetical ſtrain, and decorated with peculiar circumſtances, to render the narration more profitable and entertaining.

The time is not ſet down in which Job lived. Some have thought that he was much ancien'er than

Moſes, becauſe the law is never cited by Job or his friends, and becauſe it is related that Job himſelf offered ſacrifices. Some imagine that this book was wrote by himſelf; others ſay, that Job wrote it originally in Syriac or Arabic, and that Moſes tranſlated it into Hebrew: but the rabbins generally pronounce Moſes to be the author of it, and many Chriſtian writers are of the ſame opinion.

JOBBER, in law, a perſon that buys and ſells cattle for others. Hence ſtock-jobbers are perſons who buy and ſell ſtocks for other perſons.

IOGUIS, among the Eaſt-Indians, a kind of hermits, who generally ſtand under trees, or near their pagods. Some of them go ſtark naked, holding their arms acroſs over their heads, and continue in that poſture all their lives: others lie on the ground, with one leg higher than the other, and and their arms raiſed above their head; and theſe wretched penitents inſenſibly loſe the uſe of their arms and legs: ſome confine themſelves in cages, ſet on the top of a thick ſtake, fixed in the ground, and theſe cages are ſo ſmall, that they put the penitent to prodigious torture: ſome holding a ſabre in one hand, and a kind of ſhield in the other, go up a kind of crane, where hooking themſelves to an iron, which runs a conſiderable way into their backs, they ſpring forward into the air, flouriſhing their ſabres, and launching out into extravagant praiſes of their idols, and others plunge into the Ganges, in hopes of being devoured by a crocodile, fancying that by this means they ſhall obtain the happineſs of the next life.

Theſe miſerable wretches are conſidered by the Indians, as perfect models of piety and holineſs: they are followed by perſons of both ſexes, who make a vow of devoting themſelves to their ſervice, and are wholly employed in ſoothing their voluntary ſufferings by offering them alms and refreſhments. They call the pious to their devotions by ringing a little bell; and when they hold their ſpiritual converſations, they ſit cloſe in a ring, and ſet up a banner made of ſeveral pieces of ſtuff faſtened at the end of a ſtick,

JOHN, or *Goſpel of St.* JOHN, a canonical book of the New Teſtament, containing a recital of the life, actions, doctrine and death of our Saviour Jeſus Chriſt, written by St. John the apoſtle and evangeliſt. See the article GOSPEL.

St. John wrote his goſpel at Epheſus, after his return from the Iſle of Patmos, at the deſire of the chriſtians of Aſia. St. Jerom ſays, he would not undertake it, but on condition they ſhould appoint a public faſt, to implore the aſſiſtance of God, and that faſt being ended, St. John, filled with the Holy Ghoſt, broke out into theſe words. "In the beginning was the word," &c. The ancients aſſign two reaſons for this undertaking: the firſt is, becauſe in the other three goſpels, there was wanting the hiſtory of the beginning of Jeſus Chriſt's preaching, till the impriſonment of John the Baptiſt, which, therefore, he applied himſelf particularly to relate. The ſecond reaſon was in order to remove the errors of the Corinthians, Ebionites, and other ſects.

St. JOHN's Day, the name of two Chriſtian feſtivals, one obſerved on the 24th of June, kept in commemoration of the wonderful circumſtances attending the birth of St. John the Baptiſt; and the other on the 27th of December, in honour of St. John the Evangeliſt.

St. JOHN's WORT, a plant called by authors hypericum. See HYPERICUM.

JOINDER, or JOYNDER, in law, ſignifies the joining of two perſons in one ſuit againſt another; as for inſtance, if there are two joint-poſſeſſors of goods, and theſe are taken from one of them, they may both join in an action to recover them.

JOINERY, the art of working in wood, or of fitting various pieces of timber together.

JOINT, in general, denotes the juncture of two or more things.

The joints of the human body are called by anatomiſts articulations. See ARTICULATION.

The term joint is alſo applied to the ſeparation between the ſtones or bricks of a building, uſually filled with mortar, plaſter, or cement; alſo by carpenters, to the ſeveral manners of aſſembling or fitting pieces of wood together, as a dove-tail joint, &c.

Stiffneſs of the JOINTS, in ſurgery and medicine, ſometimes proceeds from the bones being broken, bruiſed, or wounded, eſpecially about the extreme parts, which being kept in one poſture, in order for cure, the ſynovia of the joints becomes thick, and depraves or quite aboliſhes its motion; or it may proceed from the bony juice proceeding from broken bones, and inſinuating itſelf into the joint. Hoffman ſays, diſeaſes of the joints ſometimes proceed from ſpaſms of the ligament.

JOINT-EXECUTORS, in law, are when two or more perſons are appointed ſuch by will; in which caſe they are accounted but as one ſingle perſon; ſo that the actions done by one of them are taken to be the acts of all, becauſe they all repreſent the perſon of the teſtator.

JOINT LIVES, in law, is where any thing is granted or given to two or more during their lives.

JOINT-TENANTS are ſuch as hold lands or tenements jointly by one title; as were a man grants lands, &c. to perſons and their heirs; ſuch perſons, during their joint tenancy muſt jointly plead as well as be jointly ſued, which is common to them with coparceners of lands.

JOINTURE, in law, generally implies a ſettlement of lands and tenements made on a woman in conſideration of marriage.

It alſo ſignifies a covenant, by which the huſband, or ſome friends of his, aſſures lands, &c. to his wife, for the term of her life.

JOINTURESS, or Jointress, the perſon on whom a jointure is ſettled.

JOISTS, or Joysts, in architecture, thoſe pieces of timber framed into the girders and ſommers, on which the boards of the floor are laid.

Joiſts are from ſix to eight inches ſquare, and ought ſeldom to lie at a greater diſtance from each other than ten, or at moſt twelve inches, nor ought they ever to bear a greater length than ten feet, or to be leſs into the wall than eight inches. All joiſts on the back of a chimney ought to be laid with a trimmer, at ſix inches diſtance from the back.

Some carpenters fur their joiſts, as they call it; that is, they lay two rows of joiſts, one over another, the undermoſt of which are framed level with the under ſide of the lower girder; and the uppermoſt, which lie croſs the lower ones, lie level with the upper ſide of the girder.

JONAH, or *Prophecy of* Jonah, a canonical book of the Old Teſtament, in which is related, that Jonah was ordered to go and prophecy the deſtruction of the Ninevites; but that diſobediently attempting a voyage another way, he was diſcovered by the riſing of a ſudden tempeſt, and caſt into the ſea, where he was ſwallowed up by a whale, which having lodged him three days and three nights in his belly, diſgorged him upon the ſhore; whereupon being ſenſible of his paſt danger, and ſurpriſing deliverance, he betook himſelf to the journey and embaſſy to which he was appointed; and arriving at Nineveh, the metropolis of Aſſyria, he, according to his commiſſion, boldly laid open to the inhabitants, their ſins and miſcarriages, and proclaimed their ſudden overthrow; upon which the whole city, by prayer and faſting, and a ſpeedy repentance, happily averted the divine vengeance, and eſcaped the threatened ruin.

IONIC Order, the third of the five orders of architecture, being a kind of mean between the robuſt and delicate orders.

The firſt idea of this order was given by the people of Ionia, who, according to Vitruvius, formed it on the model of a young woman of an elegant ſhape, dreſſed in her hair; whereas the Doric had been formed on the model of a ſtrong robuſt man. The Ionic order is diſtinguiſhed from the Compoſite, in that it has none of the acanthus-leaves in its capital, and from the Tuſcan and Doric, by the channels and flutings in its ſhaft.

The capital of this order is adorned with volutes, and its corniche with dentiles. The proportions of the Ionic pillar, as they are taken from the famous one in the temple of Fortuna Virilis at Rome, now the church of St. Mary the Egyptian, are theſe: 1. The entire order from the ſuperficies of the area to the corniche, are twenty-two modules, or eleven diameters. 2. The column with its baſe contains eighteen modules. The entablature contains four modules. 4. The volute of the capital is of an oval form. 5. The columns in this order are often hallowed, and furrowed with twenty-four gutters or channels, called flutings; theſe flutings are not always concave from the top of the ſhaft to the bottom, but for that third of it next the baſe, they are filled up with a kind of rods or canes; and in the other two thirds they are left hollow, or ſtriated, in imitation of the folds or plaits of a garment.

When this order was firſt invented, its height was but ſixteen modules; but the ancients to render it ſtill more beautiful than the Doric, augmented its height, by adding a baſe to it.

Mr. Le Clerc makes its entablement four modules and ten minutes, and its pedeſtal ſix entire modules; ſo that the whole order makes twenty-eight modules ten minutes.

This order is at preſent uſed properly in churches and religious houſes, courts of juſtice and other places of tranquillity and devotion.

This order has one advantage above any of the reſt, which conſiſts in this, that the fore and hind parts of its capital are different from its ſides; but this is attended with an inconvenience, when the ordonnance is to turn from the front of the building to the ſide; to obviate which, the capital may be made angular, as is done in the temple of Fortuna Virilis.

Scamozzi, and ſome other modern architects, have introduced the upper part of the Compoſite capital, in lieu of the Ionic, imitating that of the temple of Concord, whoſe four ſides are alike. To render it a little more beautiful, the volute may be made a little oval and inclining.

For the baſe, corniche, freeze, and pedeſtal of this order, ſee the articles Base, Corniche, &c.

Ionic Dialect, in grammar, a manner of ſpeaking peculiar to the people of Ionia.

Ionic Sect was the firſt of the ancient ſects of philoſophers; the others were the Italic and Ileatic. The founder of this ſect was Thales, who being a native of Miletus in Ionia, occcaſioned his followers to aſſume the appellation of Ionic: Thales was ſucceeded by Anaximander, and he by Anaximenes, both of Miletus; Anaxagoras Clazomenius ſucceeded them, and removed his ſchool from Aſia to Athens, where Socrates was his ſcholar. It was the diſtinguiſhing tenet of this ſect that water was the principle of all natural things.

Ionic Transmigration was anciently a very celebrated epocha; it took its riſe from the retreat of the Athenian colonies, who upon the death of Codrus, put themſelves under the command of his ſon Neleus, and eſtabliſhed the twelve cities of Ionia in Aſia. Theſe colonies according to Eratoſthenes, were eſtabliſhed fifty years after the return of the Heraclidæ; and, according to Marſham, ſeventy-ſeven years after the taking of Troy.

JONQUIL, in botany, the name of a ſpecies of Narciſſus. See the article NARCISSUS.

JOSHUA, a canonical book of the Old Teſtament, containing a hiſtory of the wars and tranſactions of the perſon whoſe name it bears. This book may be divided into three parts; the firſt of which is a hiſtory of the conqueſt of the land of Canaan; the ſecond which begins at the twelfth chapter, is a deſcription of that country, and the diviſion of it among the tribes; and the third compriſed in the two laſt chapters, contains the renewal of the covenant he cauſed the Iſraelites to make, and the death of their victorious leader and governor. The whole comprehends a term of ſeventeen, or, according to others, of twenty-ſeven years.

JOURNAL, a day-book regiſter, or account of what paſſes daily.

JOURNAL, or DAY-BOOK, among merchants, is that wherein the tranſactions recorded in the waſte-book, are prepared to be carried to the ledger, by having their proper debtors and creditors aſcertained and pointed out; for a more diſtinct account of which ſee the article BOOK-KEEPING.

JOURNAL, among ſeamen, a certain diary, or daily compact, of the occurrences that happen from noon to noon in the courſe of the voyage, as winds, weather, ſetting and ſhifting of ſails, and remarking the various courſes and diſtances run, which are reduced into one, and corrected by a ſolar obſervation. Every thing material that happens to the ſhip or her crew is alſo obſerved particularly in this journal.

IPECAÇUANHA, in pharmacy, a ſlender root, brought from the Spaniſh Weſt-Indies, in ſhort pieces variouſly bent and contorted, full of wrinkles and deep circular fiſſures, which reach quite down to a ſmall whitiſh woody fibre, that runs in the middle of each piece: the cortical part is compact, brittle, and looks ſmooth and reſinous on breaking. Two ſorts of this root are met with in the ſhops, one brought from Peru, the other from Braſil; uſually denominated from their external colour, the firſt whitiſh, grey, or aſh-coloured, the other brown. The firſt is generally preferred, being found to operate with the greateſt certainty and mildneſs.

A root has been brought over under the name of white ipecacuanha, which has little or nothing of the virtues of the two foregoing: this is eaſily diſtinguiſhed by its yellowiſh white colour, woody texture, and having no fiſſures or wrinkles. More dangerous abuſes have ſometimes been committed, by the ſubſtitution or mixture of the roots of an American apocynum, which have been found to operate with great violence, both upwards and downwards, and in ſome inſtances, as is ſaid, to prove fatal: theſe may be known by their being larger than the true ipecacuanha, the fiſſures more diſtant, the intermediate ſpaces ſmoother, and more particularly by the colour of the medullary fibre, which in the poiſonous roots is a deep reddiſh yellow, in the true ipecacuanha, a whitiſh or pale greyiſh.

Ipecacuanha has ſcarcely any ſmell, unleſs during its pulverization or infuſion in liquors, in which circumſtances it emits a faint nauſeous one: in chewing, the wrinkled cortical part proves bitteriſh and ſubacrid, and covers the tongue as it were with a kind of mucilage; the medullary woody fibre is nearly inſipid. Geoffroy obſerves, that in pulverizing conſiderable quantities, the finer powder that flies off, unleſs great care be taken to avoid it, is apt to affect the operator with a difficulty of breathing, a ſpitting of blood, a bleeding at the noſe, or a ſwelling and inflammation of the eyes and face, and ſometimes of the throat; and that theſe ſymptoms go off in a few days, either ſpontaneouſly, or by the aſſiſtance of venæſection.

This root is the mildeſt and ſafeſt emetic that has yet been diſcovered; and may be ventured on almoſt in the loweſt circumſtances, where the ſtomach requires to be unloaded. The common doſe is from ten grains to a ſcruple, and upwards. In the Medical Obſervations and Enquiries, publiſhed by a ſociety of phyſicians in London, a great number of caſes is mentioned, in which two grains operated ſufficiently: in conſtitutions which bore vomiting ill, and which were greatly ruffled by the uſual doſes, two or three grains operated with great eaſe. Where it fails of operating upwards, it commonly purges, and ſometimes conſiderably; in this intention it may be employed, in ſeveral caſes, to advantage, in conjunction with other purgatives, to determine its action downwards: fifteen grains of jalap with two or three of ipecacuanha have been found to purge more than twice the quantity of jalap by itſelf.

The ipecacuanha was firſt introduced, about the middle of the laſt century, as a ſpecific in dyſenteries; and repeated experience has confirmed its efficacy in this diſtemper, not only when uſed as an emetic, but likewiſe when given in ſuch ſmall doſes as ſcarcely to affect the groſſer emunctories. In common dyſenteric fluxes, it frequently performs a cure in a very ſhort ſpace of time; not by its exerting an aſtringent power, as ſome have ſuppoſed, for it does not appear to have any real aſtringency; nor by its mucilaginous ſubſtance covering the inteſtines, and incraſſating thin humours, as others, with more plauſibility, have inferred both from its mucilaginous taſte, and from the ropineſs and ſlimineſs which it manifeſtly communicates to the contents of the ſtomach; but apparently by promoting perſpiration, the freedom of which is in theſe caſes of the utmoſt importance; and an increaſe of which, even in a ſtate of health, is generally obſerved to diminiſh the evacuation by ſtool. In common dyſenteries, the ſkin is for the moſt part dry and tenſe. and perſpiration obſtructed; and indeed this obſtruction, and the converſion of the perſpirable matter

ter upon the inteſtines, is very frequently the immediate cauſe of the diſeaſe, Moſt of the common diaphoretics paſs off, in theſe caſes, without effect: but ipecacuahana, if the patient after a puke or two be covered up warm in bed, brings on a free diaphoreſis, or a plentiful ſweat, by which means the diſtemper has often terminated at once. In putrid or malignant dyſentries, or where the patient breathes a tainted air, it has not been found equally ſucceſsful: it requires here to be continued for ſeveral days, or repeated as an evacuant, with the further aſſiſtance of rhubarb, cordial antiſeptics, and mild opiates or aſtringents. Where plentiful evacuation is neceſſary, or the offending matter lodged deep, and the operation can be borne without inconvenience, the ipecacuanha is moſt advantageouſly given in ſmall quantities at a time, and repeated at proper intervals, till a vomitting or purging comes on.

IPOMÆA, in botany, a genus of plants whoſe flowers are monopetalous and funnel ſhaped, with a long cylindrical tube and ſpreading limb cut in five parts; the ſtamina are five ſubulated filaments terterminated with roundiſh antheræ; the fruit is a roundiſh capſule having three cells, incloſing three oblong ſeeds. This genus is the ſame as the quamoclit of Tournefort, and is called by ſome the ſcarlet convolvulus.

IRIS, the RAINBOW, in phyſiology. See the article RAINBOW.

IRIS, in anatomy, the anterior coloured part of the uvea of the eye. See EYE.

IRIS, in botany, a perennial plant with long narrow leaves, ſtanding edgwiſe to the ſtalk; and large naked flowers, divided deeply into ſix ſegments, of which alternately, one is erect and another arched downwards, with three ſmaller productions in the middle, incloſing the ſtamina and piſtil: the roots are tuberous, irregular, and full of joints.

IRIS, the flower-de-luce, common iris, or orrice, botany, a plant with blue flowers, whoſe arched ſegments are bearded with a yellowiſh matter, ſtanding ſeveral on one ſtalk higher than the leaves. It is a native of the mountainous parts of Germany; common in our gardens, and flowers in June.

The roots of this plant have, when freſh, a diſagreeable ſmell, and an acrid nauſeous taſte. They are a ſtrong irritating cathartic; in which intention, their expreſſed juice has been given in hydropic caſes, from one or two drams to three or four ounces, diluted largely with watery or vinous liquors to prevent its inflaming the throat.

The bluiſh expreſſed juice of the flowers changes on being inſpiſſated, eſpecially if a little lime water is added, to a fine green; and in this form is directed, in foreign pharmacopœias, for tinging ſome of the unctuous compoſitions called odoriferous or apoplectic balſams.

IRIS, Florence orrice, ſuppoſed to be only a variety of the forgoing, occaſioned by difference of climate diſtinguiſhable from it in our gardens, by the flowers being white and the leaves inclining more to bluiſh. The ſhops are ſupplied from Italy with dried roots ſuperior to thoſe of our own growth, in oblong flattiſh pieces freed from the fibres and browniſh bark, externally of a whitiſh colour, with browniſh ſpecks, internally inclining to yellowiſh, eaſily reducible into farinaceous yellowiſh white powder.

This root, in its recent ſtate, does not ſeem to differ much from the preceding; being, like it, nauſeous, acrimonious and purgative, though not quite in ſo great a degree, and loſing theſe qualities on being dried. The dry root, as met with in the ſhops, as an unctuous, bitteriſh, pungent taſte, not very ſtrong, but very durable in the mouth: and a light agreeable ſmell, approaching to that of violets. It is uſed in perfumes; in ſternutatory powders, for communicating a grateful flavour, ſomewhat like raſpberries to wines and to ſpirits; and medicinally in diſorders of the breaſt, for attenuating viſcid phlegm, and promoting expectoration.

IRON, *Mars*, in natural hiſtory, a greyiſh metal, ſoon tarniſhing in the air to a duſky blackiſh hue, and in no long time contracting a yellowiſh or reddiſh ruſt. It is the moſt ſonorous of the metals except copper; the hardeſt and moſt elaſtic of them all; hence its excellence for mechanic inſtruments: it is made into tools, by which all the others are filed, drilled, and cut; and is the only one that ſtrikes ſparks with flint. It ſpreads difficultly under the hammer, but may be extended to a great degree, drawn into wire, as ſlender as the fineſt hairs: it is more eaſily malleable when ignited than when cold; whilſt ſome of the other metals, though ductile when cold, become quite brittle by heat. It is lighter, conſiderably, than copper; and a little heavier than tin. It is the only metallic body which attracts, or is attracted by, the magnet, one of its own ores.

Iron grows red-hot much ſooner than any other metal, and this not only from the application of actual fire, but likewiſe from ſtrong hammering, friction, or other mechanic violence. It nevertheleſs melts the moſt difficultly of all the metal; requiring, in its moſt fuſible ſtate, an intenſe bright white heat. When perfectly malleable, it is not fuſible at all, without additions, or the immediate contact of the burning fuel; and when melted, it loſes that quality, which deprive it at the ſame time of the other, as if fuſibility and malleability were in this metal incompatible.

Solutions of iron made in acids give a yellow ſtain to linen, &c. and ſtrike a black colour with galls and other vegetable aſtringents. Theſe are very valuable properties of iron to the calico-printer, the ſtainer of leather, wood, &c. and the dyer. [illegible] linen and leather, the metal is common[illegible] in ſour whey or ſmall beer; for dyeing, is made uſe of. This metal affords alſo, in its calces, red and yellow pigments to the painter; and a fine blue in the preparation, called from the place where it was firſt diſcovered, Berlin or Pruſſian blue. A ſlight ſolution of vitriol has been employed by ſome as an aſſay liquor for diſtinguiſhing French brandies from common ſpirits prepared in imitation of them; French brandy having uſually an aſtringent impregnation from the oaken caſks in which it has been kept, and hence ſtriking a bluiſh or black colour with the chalybeate ſolution; whilſt ſpirits tinctured only with molaſſes, burnt ſugar, &c. give no ſuch colour. The principle on which the burnt colour depends, ſhews that it is no certain teſt: all ſpirits will exhibit it if impregnated with aſtringents; and French brandies will not, without ſuch impregnation.

Smelting of IRON *Ores.*—The ores of iron are commonly calcined previous to the fuſion; the harder ones though they ſhould contain nothing ſulphureous or arſenical, requiring that proceſs to render them pulverable. In the large works, a quantity of the ore is placed on a bottom of wood or charcoal, intermingled with ſtrata of the ſame kind of fuel; the pile carryed up to a conſiderable height, and ſet on fire.

The fuſion is performed in furnances twenty or thirty feet high, and eight, or ten feet wide in the middle, but narrower above and below. The furnace is charged at top with charcoal, and the fire excited by large bellows moved by water. When the whole internal ſurface appears of a ſtrong white heat, the ore is thrown in, by little at a time, with charcoal over it, and commonly a portion of limeſtone, the true uſe of which is probably, not as has been generally ſuppoſed, to abſorb ſulphur, but to promote the fuſion. The ore, gradually melting, drops down through the fewel into the receiver or bottom of the furnace, where a paſſage is open for taking of the ſcum or droſs. The metal, now in ſtrong fuſion, is let out, by a tap-hole, into furrows made in a bed of ſand: the large maſs which ſets in the main furrow is called by the workmen a ſow, and the leſſer ones pigs of iron. Chimney-backs, ſtoves, garden rollers. &c. are formed of this rough metal taken out of the receivers with ladles, and caſt into moulds made of fine ſand. Two or three tons of iron are run off in twenty four hours: before the force of water was called in aid to work the bellows, ſcarce an hundred weight could be obtained in a day, and a large quantity of the metal was left in the droſs: hence in ſome places, the ſlags of the old works are now remelted to advantage along with freſh ore. From the richneſs of the ſlags of different ores left by former times, ſome have been miſled into an opinion, that the metal was regenerated in them.

From the great conſumption of wood in this buſineſs, and its ſcarcity in ſome places where there are rich mines of iron, attempts have been made to ſubſtitute other fuels. Peat has been found to anſwer tolerably well: in ſome parts of England, a quantity of this has for a conſiderable time been mixed with the charcoal; and a patent has been lately obtained for running down the ore with peat alone. Pit-coal renders the iron hard and brittle: this inconvenience is ſaid to be in a good meaſure prevented, by previouſly coaking the coal, as is cuſtomary to fit it for the drying of malt.

The impure iron, as run from the ore, is melted down in another furnace, intermixed with charcoal; a ſtrong blaſt of air being impelled on the ſurface of the metal, by which its fuſion is remarkably promoted. On diſcontinuing the action of the bellows, the iron thickens into a maſs called a loop, which is conveyed under a large hammer raiſed by the motion of a water-mill. The iron, beat into a thick ſquare, is heated till ready to melt, and forged again: by a few repetitions of this proceſs, it becomes completely malleable, and is at length formed into bars for ſale. A large quantity of vitreous ſcoria ſeparates both in the fuſion and the forging: the rough caſt iron, obtained from ſome ores, loſes more than half its weight in being made into bars.

Preparation of IRON, in medicine, are, 1. The crude filings reduced to an impalpable powder, greatly recommended in female diſorders.

2. The crocus martis. See CROCUS.

3. The flores martiales, or flowers of iron. See the article FLOS.

4. The ſal martis, or ſalt of iron, which is prepared thus: mix together a quart of water, and eight ounces of the oil of vitriol; pour the oil of vitriol in by a little at a time: put the mixed liquor into a glaſs-veſſel, and add to it four ounces of the filings of iron: when the ebullition is over, evaporate the liquor to a pellicle, and ſet it to ſhoot, there will then be a green vitriol or ſalt found in fair cryſtals; dry them for uſe.

This ſalt is one of the moſt powerful preparations of this metal; it opens obſtructions of all kinds, ſtrengthens the viſcera, is an excellent medicine in cachexies, and deſtroys worms.

5. Tincture of iron, with ſpirit of ſalt, is made thus: take filings of iron, half a pound; Glauber's ſpirit of ſea ſalt, three pounds; rectified ſpirit of wine three pints: digeſt the ſpirit of ſalt and the filings together, without heat, as long as the ſpirit will work upon them; then after the fæces have ſubſided, pour off the clear liquor, evaporate it to one pound, and to this add the ſpirit of wine.

This has the ſame virtues as the crocus martis. See the article CROCUS.

6. Chalybeate, or ſteel-wine, is made in the following manner: take filings of iron, four ounces; cinnamon and mace, of each half an ounce; of

rheniſh wine, two quarts; infuſe them a month, without heat, often ſhaking the veſſel, and then filter it off for uſe.

This wine is an excellent ſtomachic and aperient; a moderate glaſs may be drank once or twice a day, or it may be mixed in apozems of the aperient vegetables.

IRONY, in rhetoric, is when a perſon ſpeaks contrary to his thoughts, in order to add force to his diſcourſe; whence Quintilian calls it *diverſiloquium.*

Thus, when a notorious villain is ſcornfully complimented with the titles of a very honeſt and excellent perſon; the character of the perſon commended, the air of contempt that appears in the ſpeaker, and the exorbitancy of the commendations, ſufficiently diſcover the diſſimulation or irony.

IRRADIATION, the act of emitting ſubtile effluvia, like the rays of the ſun every way.

IRRATIONAL, an appellation given to ſurd numbers and quantities. See the articles NUMBER, QUANTITY, and SURD.

IRREGULAR, ſomething that deviates from the common forms, or rules; thus we ſay an irregular fortification, an irregular figure, &c. See the article FORTIFICATION, &c.

IRREGULAR, in grammar, ſuch inflections of words as vary from the general rules; thus we ſay, irregular nouns, irregular verbs, &c.

IRREGULAR BODIES are ſolids not terminated by equal and ſimilar ſurfaces.

IRREGULAR COLUMN, in architecture, a column which does not only deviate from the proportions of any of the five orders, but whoſe ornaments, whether in the ſhaft or capital, are abſurd and ill choſen.

ISAIAH, or *Prophecy of* ISAIAH, a canonical book of the Old Teſtament. Iſaiah is the firſt of the four greater prophets, the other three being Jeremiah, Ezekiel, and Daniel. This prophet was of royal blood, his father Amos being brother to Azariah, king of Judah. The five firſt chapters of this prophecy relate to the reign of Uzziah; the viſion, in the ſixth chapter, happened in the time of Jotham: the next chapters to the fifteenth, include his prophecies under the reign of Ahaz; and thoſe that were made under the reigns of Hezekiah and Manaſſeh, are related in the next chapters to the end. The ſtile of this prophet is noble, ſublime, and florid. Grotius calls him the Demoſthenes of the Hebrews. He had the advantage, above the other prophets, of improving his diction by converſing with men of the greateſt parts and elocution, and this added a ſublimity, force, and majeſty to what he ſaid. He impartially reproved the vices of the age in which he lived, and openly diſplayed the judgments of God that were hanging over the Jewiſh nation; at the ſame time denouncing vengeance on the aſſyrians, Egyptians, Ethiopians, Moabites, Edomites, Syrians, and Arabians, who were inſtrumental in inflicting thoſe judgments. He foretold the deliverance of the Jews from their captivity in Babylon, by the hand of Cyrus king of Perſia, an hundred years before it came to paſs; but the moſt remarkable of his predictions are thoſe concerning the Meſſiah, in which he not only foretold his coming in the fleſh, but all the great and memorable circumſtances of his life and death.

ISATIS, woad, in botany, a genus of plants whoſe flower conſiſts of four oblong cruciform petals, turning gradually ſmaller towards the ungues: the fruit is an oblong lanceolated-obtuſe compreſſed pod, containing two valves, and conſiſting of one cell, which incloſes an ovate compreſſed ſeed in the center of the fruit.

The common woad which is cultivated in ſeveral parts of England for the purpoſes of dying, is a biennial plant, and raiſed from the ſeed, which ſhould be ſown in July or Auguſt, and afterwards hoed in the ſame manner as is practiſed with turnips. Theſe plants have uſually three, four, or five crops of leaves every year, of which the firſt is beſt for uſe, and the reſt in their order. The leaves are fit for gathering when fully grown and perfectly green; they are then to be taken to a woad-mill to be ground ſmall, after which they are laid eight or ten days on heaps, and are at length made into a kind of balls, which are laid in the ſhade on hurdles to dry; this done, they are broke or ground to powder, which is then ſpread on a floor and watered; here it is let to ſmoak and heat, till by torrifying it every day it becomes quite dry and fit for uſe.

A woad blue is a very deep blue, almoſt black, and is a blue of ſo many tints, that the dyers have a ſcale by which they compoſe the ſeveral caſts or degrees of woad, from the brighteſt to the deepeſt.

With this plant the ancient Britons uſed to paint themſelves: it is not much uſed in medicine, but accounted very aſtringent, and effectual in ſtopping hæmorrhages.

ISCHAEMUM, in botany, a genus of plants producing male and female flowers; the male is a ſmall bivalvular glume, placed on the calyx of the female flower, which is a biflorous gloom; the ſeed is ſingle, and involved in the calyxes and corollulæ.

The whole plant is of a fragrant aromatic ſmell, and is accounted cephalic.

ISCHIADIC, in anatomy, a name given to two crural veins, called the greater and leſſer iſchias. See the article VEIN.

ISCHIUM, in anatomy, the name of a bone deſcribed under the article innominata oſſa. See the article INNOMINATA.

ISCHURY, *Iſchuria*, in phyſic, a ſuppreſſion of urine.

The word is Greek, ισχȣρια, and formed from ισχω, to retain, and ȣρον, urine.

ISIA, feaſts and ſacrifices anciently ſolemnized in honour of the goddeſs Iſis.

ISINGLASS, *Ichthyocolla*, in the materia medica, &c. See Ichthyocolla.

ISLAND, a tract of dry land, encompaſſed with water, in which ſenſe it ſtands contradiſtinguiſhed from continent, or terra firma.

ISLE, in general, denotes the ſame with iſland, only frequently uſed in a diminutive ſenſe.

Isles, in architecture, denote the ſides or wings of a building.

ISNARDIA, in botany, a genus of tetrandrious plants, whoſe flower is deſtitute of a corolla; the fruit is formed of the ſquare baſe of the cup, having four cells, which contain a few ſeeds of an ablong form.

ISOCHRONAL, Isochrone, or Isochronous, is applied to ſuch vibrations of a pendulum, as are performed in the ſame ſpace of time, as all the vibrations or ſwings of the ſame pendulum are, whether the arches it deſcribes be longer or ſhorter: for when it deſcribes a ſhorter arch, it moves ſo much the ſlower, and when a long one proportionably faſter.

Isochronal Line, that in which a heavy body is ſuppoſed to deſcend without any acceleration. See the article Acceleration.

ISOPERIMETICAL Figures. See Maximum and Minimum.

ISOPYRUM, a genus of plants, whoſe flower conſiſts of five equal ovated and patent petals, with the ſame number of ſhort tubulated nectariums; the ſtamina are numerous, hairy, and ſhorter than the corolla; the perianthium is compoſed of a number of recurved lunulated capſules, which are unilocular, and contains many ſmall ſeeds.

ISOSCELES, Triangle, in geometry, a triangle which hath two equal ſides, as A B C (plate LXXVII. *fig.* 1.) where the ſide A B is equal to A C.

ISPIDA, the king-fiſher, in ornithology, a genus of the picæ-order of birds, with a bill of a trigonal figure, ſomewhat arcuated, compreſſed, and its two chaps equal: there are four toes on each foot, with only one of them placed behind.

This is a very numerous genus, the ſpecies of which are chiefly diſtinguiſhed by their ſize and different colours.

ISSUE, in law, has ſeveral ſignifications, it being ſometimes taken for the children begotten between a man and his wife; ſometimes, for profits ariſing from amercements and fines; and ſometimes for the profits iſſuing out of lands or tenements: but this word generally implies the concluſion, or point of matter, that iſſues from the allegations and pleas of the plaintiff and defendant in a cauſe tried by a jury of twelve men.

Issues, in ſurgery, ſmall artificial apertures made in a fleſhy part of the body, to drain off ſuperfluous or noxious humours.

An iſſue ſhould be made in the middle of a muſcle, that the neceſſary motion of the part may not incommode or put the patient to pain. The beſt way of making iſſues in children is by applying a ſmall piece of bliſtering plaſter, as big as a pea, to the part; and letting it lie on for a few hours, it will cauſe a bliſter: upon raiſing the ſkin, apply a pea, and compreſs it tight with a bandage, till by degrees it ſinks in and forms an iſſue.

ISTHMIA, or Istmian Games, ισθμια, one of the four ſolemn games which were celebrated every fifth year in Greece; ſo called from the Corinthian iſthmus, where they were kept.

ISTHMUS in geography, a narrow neck of land that joins two continents, or joins a peninſula to the terra firma, and ſeparates two ſeas. The moſt celebrated iſtmuſes are thoſe of Panama, or Darien, which joins North and South America; and that of Suez, which connects Aſia and Africa; that of Corinth, of Crim Tartary, &c.

ITALIAN, the language ſpoken in Italy.

This tongue is derived principally from the Latin; and of all the languages formed from the Latin, there is none which carries with it more viſible marks of its original than the Italian. It is accounted one of the moſt perfect among the modern tongues, containing words and phraſes to repreſent all ideas, to expreſs all ſentiments, to deliver one's ſelf on all ſubjects, to name all the inſtruments and parts of arts, &c. It is however complained, that it has too many diminutives and ſuperlatives, or rather augmentatives, but without any great reaſon: for if theſe words convey nothing farther to the mind than the juſt ideas of things, they are no more faulty than our pleonaſms and hyperboles. The language correſponds to the genius of the people; they are ſlow and thoughtful, and accordingly their language runs heavily, though ſmoothly, and many of their words are lengthened out to a great degree. They have a great taſte for muſic; and to gratify their paſſion this way, have altered abundance of their primitive words, leaving out conſonants, taking in vowels, ſoftening and lengthening out their terminations for the ſake of the cadence. Hence the language is extremely muſical, and ſucceeds better than any other in operas, and ſome parts of poetry; but it fails in ſtrength and nerves: hence alſo, a great part of its words borrowed from the Latin, become ſo far diſguiſed, that they are not eaſily known again.

ITALIC Characters, in printing. See the article Letter.

Italic or Italian Hours, the twenty-four hours of the natural day, accounted from the ſunſetting of one day, to the ſame again, the next day. See Hour.

Italic Sect, a part of ancient philoſophers, founded by Pythagoras, ſo called, becauſe that philoſopher taught in Tarentum, Metapontus, Heraclea, Naples, &c. in Italy.

ITCH, a diſeaſe of the ſkin which is corrupted by the oozing out of certain ſharp humours, which gather into puſtules, and occaſion a prurigo or itching.

The itch is either moiſt or dry, which, appearing in the joints principally at firſt, gradually ſpreads through the reſt of the body, except the head.

This diſeaſe firſt appears in a reddiſh roughneſs of the ſkin; which is ſucceeded by pimples, that let out matter or a ſharp ichor; and the exulceration is attended with itching, and ſpreads by contagion. It may juſtly be called an animated diſeaſe, as owing its origin to ſmall animals. For there are certain inſects, ſo very ſmall as hardly to be ſeen, without the aſſiſtance of a microſcope, which depoſit their eggs [illegible] furrows of the cuticle, as in proper neſts; where, by the warmth of the place, they are hatched in a ſhort time, and the young ones coming to full growth penetrate into the very cutis with their ſharp heads, and gnaw and tear the fibres. Their bitings cauſe an intolerable itching, which brings on a neceſſity of ſcratching; whereby the part is torn, and emits a thin humour, which concretes into hard ſcabs; whilſt the little worms conſtantly burrowing under the cuticle, and laying their eggs in different places, ſpread the diſeaſe.

Hence the reaſon manifeſtly appears why the diſeaſe is communicated by the linen, wearing apparel, gloves, &c. which were uſed by infected perſons: for the eggs which had ſtuck to ſoft ſubſtances of this kind, are rubbed into the furrows of the cuticle, and are there hatched and nouriſhed.

Now what is of greateſt moment in this theory is, that the knowledge of the true cauſe of the diſeaſe naturally points out the cure: for neither cathartics nor ſweeteners of the blood are of any ſervice here; the whole management conſiſts in external applications, in order to deſtroy theſe corroding worms, and this is eaſily effected: wherefore, firſt let the patient go into a warm bath, and then let the parts affected be anointed every day, either with the ointment of ſulphur, or the ointment with precipitate of mercury, which is leſs offenſive to the olfactory organs; inſtead of which a liniment may be made of orange flowers, or red roſes, the mercurial red corroſive, and hogs-lard, pounded together, which is of a very pleaſant ſmell, and of equal efficacy. *Mead.*

ITEA, in botany, a ſhrub whoſe characters are as follow: it riſes to the height of ſix or ſeven feet, ſending out many branches from the ground; theſe are furniſhed with ſpear-ſhaped leaves, ſlightly ſawed at their edges, placed alternately, and of a light green colour: the flowers come out in ſpikes, at the extremity of the ſame year's ſhoot, each of which are compoſed of five lanceolated petals inſerted in the cup, with five ſtamina: the fruit is a long oval capſule, with the ſtyle at top, having one cell which contains a number of ſmall oblong ſeeds.

This plant is a native of North-America, and will thrive in moiſt land very well with us; it is propagated by laying, and bloſſoms in July.

ITINERANT Judges, a name formerly given to thoſe judges who were ſent into ſeveral countries to hear cauſes.

JUBILEE, among the Jews, denoted every fiftieth year, being that which followed the revolution of ſeven weeks of years; at which time all ſlaves were made free, all debts annihilated, and all lands, &c. reverted to their ancient poſſeſſors; all agriculture was forbid, and the poor intitled to all the productions of the earth that year. The privilege extended only to original Iſraelites.

According to Maſius, the word is derived from Jubal, the inventor of Muſical inſtruments; whence the words Jobel, and Jubilee, ſignified the year of deliverance and remiſſion, becauſe proclaimed with the ſound of one of thoſe inſtruments, which at firſt was no more than the horn of a ram.

The Chriſtians, in imitation of the Jews, have likewiſe eſtabliſhed jubilees, which began in the time of pope Boniface VIII. in the year 1300, and and are now practiſed every twenty-five years; but theſe relate only to the pretended forgiveneſs of ſins, and the indulgences granted by the church of Rome: together with the privilege of performing a thouſand frolics in maſquerade.

JUDAISM, the religious doctrines and rites of the Jews. See Jews.

JUDAS-Tree, *Circis*, in botany. See the article Circis.

JUDE, or *the General Epiſtle of* Jude, a canonical book of the New-Teſtament, written againſt the heretics, who by their diſorderly lives and impious doctrines, corrupted the faith and good morals of the Chriſtians. St. Jude draws them in lively colours, as men given up to their paſſions, full of vanity, conducting themſelves by worldly wiſdom, and not by the ſpirit of God.

In the early ages of Chriſtianity, ſeveral rejected this Epiſtle becauſe the apocryphal books of Enoch and the aſcenſion of Moſes are quoted in it. Nevertheleſs, it is to be found in all the ancient catalogues of the ſacred writings; and Clement of Alexandria, Tertullian and Origen, quote it as written by Jude, and reckon it among the books of ſacred Scripture.

St. Jude's Day, the ſame with that of St. Simon. See the article Simon.

JUDGE, an officer appointed by the ſovereign powers of any country to diſtribute juſtice to their ſubjects which they themſelves cannot do in perſon.

Book of JUDGES, a canonical book of the Old-Teſtament, ſo called from its relating the ſtate of the Iſraelites, under the adminiſtration of many illuſtrious perſons who were called judges, from their being both the civil and the military governors of the people, and who were raiſed up by God upon ſpecial occaſions, after the death of Joſhua, till the time of their making a king. In the time of this peculiar polity, there were ſeveral remarkable occurrences, which are recorded in this book. It acquaints us with the groſs impiety of a new generation which ſprung up after the death of Joſhua, and gives us a ſhort view of the diſpenſations of heaven towards this people, ſometimes relieving and delivering them, and at others, ſeverely chaſtiſing them by the hands of their enemies.

The book of Judges is uſually divided into two parts; the one containing the hiſtory of the judges from Othniel to Sampſon, which ends with the ſixteenth chapter; the other containing ſeveral memorable actions, which were performed in or about the time of the judges, from the ſeventeenth chapter to the end of the book. The author of this book is wholly unknown: ſome aſcribe it to Samuel, others to Hezekiah, and others to Ezra.

JUDGMENT, among logicians, a faculty, or rather act of the human ſoul, whereby it compares its ideas, and perceives their agreement or diſagreement. See the article KNOWLEDGE.

JUDGMENT, in law, the ſentence of the judges upon a ſuit, &c.

JUDGMENTS *for Crimes*, in caſe of treaſon or felony, muſt be by an expreſs ſentence, an outlawry, or abjuration: and no judgment can be inflicted contrary to law, or that is not appointed by act of parliament.

JUDGMENTS *for Debts*, are acknowledged by a perſon's giving a general warrant of attorney to any attorney of the court in which it is to be acknowledged, to appear for him at the ſuit of the party to whom the ſame is to be done, and to file common bail, receive a declaration, and then to plead, *non ſum informatus*, I am not informed; or to let it paſs *nihil dicit*, he ſays nothing; upon which judgment is entered for want of a plea.

JUGALE, in anatomy, the cheek bone. See the article MALA.

JUGERUM, in Roman antiquity, a ſquare of one hundred and twenty Roman feet; its proportion to the Engliſh acre being as ten thouſand to ſixteen thouſand and ninety-ſeven. See MEASURE.

JUGLANS, the walnut-tree, in botany. See the article WALNUT.

JUGULAR, in anatomy, an appellation given to two veins of the neck, which ariſe from the ſubclavians. 1. The external jugular, diſtributed over the external parts of the head; and which, in its ſeveral parts, receives different denominations from them, as the frontal, temporal, occipital, &c. vein. 2. The internal jugular, which gives ramifications to the larynx, the pharynx, the muſcles of the os hyoides, and to the tongue; thoſe which are under its vertex being called raninæ. But beſides theſe branches, its trunk terminates in a diverticulum, called a jugular ſack, and brings back the blood from the ſinuſes of the dura mater, and from the brain. See the article VEIN.

There are alſo certain glands in the anterior part of the neck, called jugular. See GLAND.

JUICE is alſo uſed to denote the liquors of animals, as the nervous juice, the pancreatic juice, &c.

JUJUBES, *Jujubæ*, in pharmacy, a fruit of the plumb kind, about the ſize and ſhape of an olive, conſiſting of a pretty thick reddiſh yellow ſkin, a whitiſh fungous pulp, and a wrinkled ſtone of an oblong figure. It is the produce of a prickly tree, with three-ribbed leaves, and herbaceous or yellowiſh flowers, ſometimes found wild, and commonly cultivated in the ſouthern parts of Europe.

The fruit has an agreeable ſweet taſte; and in thoſe countries where it is common, makes an article of food in its recent ſtate, and of medicine when half dried; decoctions of it being uſed, like other glutinous ſweets, as incraſſants, and demulcents in defluxions on the breaſt.

The jujubes have been made a general ingredient in pectoral decoctions; but they are now become a ſtranger to the ſhops, the tree not producing fruit in this climate; and that which we received from abroad being commonly mouldy or carious

JULEP, in pharmacy, an alterative medicine, unknown to the ancient Greeks, and invented by the Arabians, compoſed chiefly of diſtilled waters, &c. and ſweetened with ſugar or proper ſyrups.

It was ſo called becauſe uſually prepared of ſweet ingredients, julep ſignifying, in the Perſian language, a ſweet potion.

JULIAN PERIOD, in chronology, a period ſo called as being adapted to the Julian year.

It is made to commence before the creation of the world. Its principal advantage lies here, that the ſame years of the cycles of the ſun, moon, and indiction, of which three cycles it was made to conſiſt by Joſeph Scaliger in 1580, belonging to any year of this period, will never fall together again till after the expiration of ſeven thouſand, nine hundred, and eighty years. There is taken for the firſt year of this period, that which hath the firſt of the cycle of the ſun, the firſt of the cycle of the moon, and the firſt of the indiction cycle, and ſo reckoning on.

The firſt year of the Chriſtian æra is always, in our ſyſtems of chronology, the 4714th of the Julian period.

To find what year of the Julian period any given year of Chriſt anſwers to: to the given year of Chriſt add 4713, becauſe ſo many years of the Julian period were expired A.D. 1; and the ſum gives the year of the Julian period ſought.

On the contrary, having the year of the Julian period given, to find what year of Chriſt anſwers thereto: from the year of the Julian period given ſubtract 4713, and the remainder will be the year ſought.

JULUS, in botany, the ſame with what is otherwiſe called catkins or amentaceous flowers.

JULUS is alſo the name of an inſect very common among rubbiſh, and called in Engliſh the gally-worm: it is furniſhed with a great number of feet, has the power of rolling itſelf up like a ball when touched, and is eſteemed a very valuable medicine in the jaundice and ſuppreſſion of urine.

JULY, the ſeventh month of the year, during which the ſun enters Leo.

It was called Julius, by Marc Anthony, from the ſurname of the dictator C. Cæſar, who was born in this month. It was before called Quintilis, as being the fifth month of the year in Romulus's calendar, which began in March.

JULY-FLOWER. See the articles CARNATION and STOCK.

JUMENTA, in zoology, the name by which Linnæus calls the fifth order of quadrupeds, the characteriſtic of which is, that the teeth of all the animals belonging to it are placed in a different manner from the other five orders. See the article QUADRUPED.

To this order belong the elephant, rhinoceros, hippopotamus, horſe, and hog. See ELEPHANT, RHINOCEROS, &c.

JUNCUS, the ruſh, in botany. See the article RUSH.

JUNCUS ODORATUS, a name ſometimes given to ſchoenanth. See SCHOENANTH.

JUNGERMANNIA, in botany, a genus of the cryptogamia algæ claſs of plants, conſiſting uſually of ſtalks furniſhed with leaves, diſpoſed in a pinnated or ſquamous manner, ſometimes of leaves only. The male flower ſtands on a long ſtraight pedicle, which ariſes out of a calyx, growing from the upper part of the ſurface: it hath no corolla; but the cup, which is a tubulous perichætium, contains an ovate antheræ, which opens into four valves, and remains in this ſtate a long while on the plant. The female flower has no pedicle: there is no viſible calyx or corolla, but all that is ſeen is a number of roundiſh ſeeds lying naked in a cluſter, and ſometimes only a ſingle one.

This is the muſcoides of Micheli, and the lichenaſtrum of Dillenius.

JUNIPER, *Juniperus*, in botany, a genus of plants belonging to the dioecia claſs; the male flowers are apetalous; the calyces growing oppoſite by threes, ſo as to form a conic amentum, each of which is a broad, ſhort, incumbent ſquama, and fixed to the column by a very ſhort footſtalk: the female flower hath a perſiſtent calyx, with three rigid, acute, premanent petals: the fruit is a roundiſh fleſhy berry, containing three ſtony ſeeds, convex on one ſide but oblong and angular on the other.

This genus includes the American cedars and ſavin.

The common juniper is a well known evergreen ſhrub, growing in many parts of Europe, in woods, and mountainous places. All the parts of this plant are of a balſamic nature, as are in ſome meaſure all the evergreens, the glutinous and adheſive properties of their juices preſerving them from thoſe decays which deciduous plants are ſubject to.

The gum flowing from this plant was the ſandaraca of the Arabians; and with that melted in a ſufficient quantity of oil of turpentine, is made the factitious varniſh now uſed by painters and cabinet-makers.

The berries are ſuppoſed to contain the virtues of the whole, and are very much uſed for medicinal purpoſes; theſe ſhould be choſen, freſh, plump, full of pulp, and of a ſtrong taſte; they are powerful attenuants, diuretics, and carminatives, very much contributing to diſſipate wind and flatulencies in the ſtomach and bowels; but their moſt celebrated and remarkable properties are in deterging and ſcowering the viſcera, and particularly the reins and urinary paſſages, as all, indeed, of the turpentine kind do; for this reaſon they are frequently met with in compoſitions, both officinal and extemporaneous, for the jaundice, cachexies, dropſies, and difficulties of urine. The berries chewed, or the eſſential oil taken only in a few drops, give the urine the ſame ſcent that it has after taking turpentine; but theſe berries are not to be given indiſcriminately, for in hot habits they often counteract the very purpoſes intended to be anſwered by them; therefore, in all caſes where there is a danger of an inflammation, either in the primæ viæ or in the kidneys, the uſe of juniper-berries ſhould be avoided.

Formerly a diſtilled ſpirituous water of juniper was kept in the ſhops, but the vulgar getting an opinion of its being a pleaſant dram, the making of it became the buſineſs not only of the apothecary but alſo of the diſtiller, who ſells it under the name of geneva, or gin, which is only an indifferent ſpirit impregnated with theſe berries.

JUNK, among ſailors, certain pieces of old cable cut into different lengths.

JUNO, in aſtronomy, the name by which ſome call the ſecond of Jupiter's ſatellites. See the article JUPITER.

JUNTA, JUNTO, or JUNCTO, in matters of government, denotes a ſelect council for taking cognizance of affairs of great conſequence, which require ſecrecy.

IVORY, *Ebur*, the tuſk, or dens exertus of an elephant, growing on each ſide of his trunk, in form of a horn. Each tuſk is ſix or ſeven feet in length, and as thick as a man's thigh at the baſe, and almoſt ſolid; and both together ſometimes weigh about three hundred and thirty pounds.

It is much eſteemed for its colour, poliſh, and the fineneſs of its grain when wrought.

JUPITER, ♃, in aſtronomy, one of the ſuperior planets, remarkable for his brightneſs.

This planet is ſituated between Saturn and Mars, and revolves abour his own axis in 9 hours 56 minutes. His periodical revolution round the ſun is performed in 4332 days, 12 hours, 20 minutes, or almoſt 12 years, in an orbit whoſe radius or ſemidiameter is equal to 424 millions of miles. The inclination of the orbit to the plane of the ecliptic is 1° 20′. The place of the node ♋ 7° 19′ 54″; and of the aphelion ♎ 9° 9′ 54″.

Jupiter is the largeſt of all the planets, his diameter being 81155 Engliſh miles. See the article Planet.

Jupiter has had his ſpots obſervable, ever ſince the invention and uſe of large teleſcopes; and from repeated obſervations, they ſhew Jupiter's revolution about his axis is in 9 hours and 56 minutes. Beſides theſe ſpots, Jupiter has the appearance of three zones or belts encompaſſing his body, and ſometimes more, ſo that his diſk ſeems clouded with them: what they are no body yet can tell. The axis of this planet is alſo nearly perpendicular to the plane of his orbit.

Conſidering the large magnitude of Jupiter, and his ſhort diurnal rotation, the equatorial parts of his ſurface muſt have a prodigious velocity, which of conſequence muſt cauſe him to be of a ſpheroidical figure (as was ſhewn of the earth). Accordingly Caſſini found the axis of the equator to be to that of the poles as 14 to 15; but Mr. Pound afterwards more exactly determined them to be as 12 to 13, agreeable to Sir Iſaac Newton's computation.

Jupiter is obſerved with a teleſcope to have four ſatellites, which move about him in the times and diſtances following, viz. The firſt in 1 day, 18 hours, 27 minutes, at the diſtance of 5.6 ſemi-diameters of Jupiters body from his center, as meaſured by a micrometer. The ſecond in 3 days, 13 hours, 13 minutes, at the diſtance of 9 ſemi-diameters. The third in 7 days, 3 hours, 42 minutes, at the diſtance of 14.3 ſemi-diameters. The fourth in 16 days, 16 hours, 32 minutes, at the diſtance of 25.3 ſemi-diameters.

Galileo firſt diſcovered the ſatellites or moons of Jupiter, in the year 1610; and called them Medicea ſidera, or Medicean ſtars, in honour of the family of the Medici, his patron. The famous piece called Siderens Nuncius, in which he particularly deſcribes the diſcovery of theſe ſtars, he dedicated to Coſmus Medicis II. the fourth great duke of Hetruria.

The orbits of Jupiter's moons lie nearly in the plane of the ecliptic, which is the reaſon why their motion is apparently in right line, and not circular, as it really is.

The moons of Jupiter ſeverally ſhew the ſame phaſes to him as ours does to us. They diſappear from our ſight ſometimes, ſo that it is very rare to have all the four in view at once; nor is it poſſible to know which ſatellite in order you ſeee, but from the knowledge of the theory and calculation; becauſe the remoteſt ſatellite may appear neareſt to Jupiter, and the contrary.

By means of Jupiter's ſatellites ſeveral noble problems in natural philoſophy have an eaſy and elegant ſolution; the firſt of which is to determine the ratio of the velocity of light: for the manner how this is done, ſee the article Light. The ſecond is to determine the longitude of a place from any propoſed meridian; which is eaſily done by the following method: Let the moment of time in which the ſatellite enters the ſhadow of Jupiter be calculated for the given meridian from tables of its motion: then let the moment of time be well obſerved, when this immerſion happens at the propoſed place; the difference of theſe two moments turned into motion will give the longitude of the place, allowing 15 degrees for every hour, 1 degree for every 4 minutes of time, or 15 minutes of a degree for every minute of time. See Longitude.

JURISDICTION, in law, ſignifies the power and authority with which any perſon is inveſted in adminiſtering juſtice in caſes of complaint laid before him.

JURISPRUDENCE, the ſcience of what is juſt or unjuſt; or the knowledge of laws, rights, cuſtoms, ſtatutes, &c. neceſſary for the adminiſtration of juſtice.

JUROR, in law, ſignifies any perſon ſworn on a jury.

JURY, a certain number of men ſworn to enquire into and try a matter of fact, and to declare the truth upon ſuch evidence as ſhall appear before them.

Juries are, in theſe kingdoms, the ſupreme judges in all courts and in all cauſes in which either the life, property, or reputation of any man is concerned: this is the diſtinguiſhing privilege of every Briton, and one of the moſt glorious advantages of our conſtitution; for as every one is tried by his peers, the meaneſt ſubject is as ſafe and as free as the greateſt.

All criminal cauſes muſt firſt be tried by a grand jury, which commonly conſiſts of twenty-four men of greater note than the petit-jury, who are choſen indifferently out of the whole country, and no man can ſuffer the diſgrace of being tried in an ignominious cauſe, without their firſt finding him guilty; if they find him innocent, he is immediately diſcharged; but if otherwiſe, they only find an indictment,

dictment, on which he is tried, and finally acquitted or convicted by the verdict of the petit-jury, who are not only to be returned from the county, where the fact was done, but near neighbours, ſuch as are moſt ſufficient and leaſt ſuſpicious; to prevent partiality, the names of the perſons impannelled are wrote on ſeveral pieces of paper of equal ſize, and delivered by the under-ſheriff to the judge's marſhal, who cauſes them to be rolled up, all in the ſame manner, and put together in a box, and when any cauſe is brought to trial, ſome indifferent perſon is to draw out twelve of theſe papers, and the perſons whoſe names are drawn, if not challenged, are to be the jury to try the cauſe; and in caſe any are challenged, and ſet aſide, or do not appear, then a further number is to be drawn till there is a full jury. See CHALLENGE.

When a juryman is ſworn, he muſt not depart from the bar on any account whatſoever, till the evidence is given, without leave of the court; and if that be obtained, he muſt have a keeper with him. As ſoon as the whole evidence is ſummed up, the jury are to be kept together till they are all in one mind, and unanimous in bringing in their verdict, without being admitted to the ſpeech of any perſon, and without meat, drink, fire, or candle. They are fineable if they agree to caſt lots for their verdict, and alſo for being tampered with in relation to it: but as they are the ſole judges of the fact, they are not fineable for giving a verdict contrary to what may appear plain evidence, becauſe the law preſumes that they may have ſome other evidence beſides what is given in court; but where any corruption appears, a jury may be attainted for going contrary to evidence; and if a juror takes any thing either of the plantiff or defendant for giving a verdict, he is to pay ten times as much as he has taken, or ſuffer a year's impriſonment; yet in trying cauſes, juries are to have their charges allowed them by the court. In all caſes of difficulty it is ſafeſt for the jury to find the eſſential matter, and to leave it to the judge to determine how the law ſtands upon the fact.

Infants, perſons of ſeventy years of age, and upwards, clergymen, apothecaries, &c. are exempted from ſerving upon juries; and barons, and all above them, are not to ſerve in any ordinary jury. Jurors, in London, muſt not only be houſekeepers, but muſt have land or goods with one hundred pounds; and they may be examined on oath as to that point. 3 Geo. II. c. 25.

The qualifications of a juryman for a county, is ten pounds per annum, either in freehold or copyhold-eſtate within the ſame county; but cities, boroughs, and corporate towns, are excepted by the ſtatutes: however, no jury is obliged to appear upon a trial at Weſtminſter, where the offence was committed thirty miles off, except it be required by the king's attorney-general. According to uſage, the ſheriff ſhould return twenty four jurors, in order to ſpeed the trial in caſe of challenge, ſickneſs, &c. and ſhould he only return twelve purſuant to the writ, he is liable to be amerced. By 4 and 5 W. and M. no ſheriff bailiff, &c. under the penalty of ten pounds, ſhall return any perſon to ſerve on a jury who has not been duly ſummoned ſix days before his appearance, nor under the like penalty, ſhall he accept of money, or other reward, for excuſing the appearance of a juryman: jurymen neglecting to appear, ſhall be fined in a ſum not exceeding five pounds, nor leſs than forty ſhillings, except they can give a reaſonable excuſe for their non-appearance; and in caſe a juryman does appear, but refuſes to be ſworn, or to give a verdict, an attachment may be iſſued againſt him.

When it is conceived that an indifferent and impartial jury will not be returned by the ſheriff, a ſpecial jury is allowed; in which caſe the court, upon a motion made, will order the ſheriff to attend the ſecondary of the king's bench with his book of freeholders of the county, and the ſecondary is to mark a jury in the preſence of the attornies on both ſides: alſo, if a cauſe of conſequence is to be tried, the court of king's bench, on a motion upon an affidavit made, will make a rule for the ſecondary to name forty-eight freeholders, out of which each party is to ſtrike out twelve, one at a time, the plantiff's attorney beginning firſt, and the remainder of the jurors will be the jury for the trial: though the nomination of a ſpecial jury ought to be in the preſence of the attornies on each ſide; yet in caſe either of them neglects, or refuſes to attend, the ſecondary may proceed and ſtrike out twelve for the attorney that makes default. By 3 G. II. c. 25. on the motion of the proſecutor, plaintiff or defendant, on trials of iſſues on indictments, and in all actions whatſoever, the courts of Weſtminſter are authoriſed to order a ſpecial jury to be ſtruck in the ſame manner as upon trials at bar. Where a ſpecial jury is ordered by a rule of court, in any cauſe ariſing in a city, corporation, &c. this jury is to be taken out of the liſts or books of the perſons qualified, which are to be produced by the ſheriffs, &c. before the proper officer. The ſame indulgence is granted both to merchants and foreigners; for where two merchants are plantiff and defendant, the court may be moved for a jury of merchants to try the iſſue between them; and if either of the parties in the ſuit be an alien, the jury at the deſire of the party, is to be compoſed of half foreigners and half Engliſh. See the articles PEERS and VERDICT.

JURY-MASTS, in the marine, certain ſpare maſts which are erected in a ſhip, when the others are carried away by the violence of a ſtorm, or otherwiſe.

JUSSIÆA, in botany, a genus of plants, whoſe flower contains five roundiſh patent petals, with ten ſhort ſlender filaments topped with roundiſh antheræ. The fruit is an oblong thick capſule, crowned by the cup, which opens lengthways, and contains a number of ſmall ſeeds diſpoſed in ſeries.

JUST, a ſportive combat on horſeback, man againſt man, armed with lances.

JUSTICE, *Juſtitia*, in a moral ſenſe, is one of the four cardinal virtues, which gives every perſon his due.

JUSTICE, *Juſticiarius*, in a legal ſenſe, a perſon deputed by the king to adminiſter juſtice to his ſubjects, whoſe authority ariſes from his deputation, and not by right of magiſtracy.

JUSTICES *of the Peace* are perſons appointed by the king's commiſſion to keep the peace of the county in which they reſide; and ſome of theſe, who are of ſuperior rank or quality, are called juſtices of the quorum, and without the preſence or aſſent of theſe, or at leaſt one of them, no buſineſs of importance can be diſpatched.

JUSTICES *within Liberties*, are juſtices of the peace who have the ſame authority in cities or other corporate towns, as the others have in counties, and their power is the ſame, only theſe laſt have the aſſize of ale and beer, wood and victuals, &c.

JUSTICE-SEAT, is the higheſt foreſt court, always held before the lord chief juſtice in eyre of the foreſt; in which court fines are ſet for offences, and judgments given.

JUSTICIARY, or *Court of* JUSTICIARY, in Scotland, a court of ſupreme juriſdiction in all criminal caſes.

JUSTIFICATION, in law, ſignifies a maintaining, or ſhewing a ſufficient reaſon in court, why the defendant did what he is called to anſwer.

IVY, *hedera*, in botany, a well known evergreen plant, frequently to be met with growing againſt trees, walls, houſes, and churches; it ſends forth roots or fibres from its branches, by which it faſtens itſelf to whatever is near it, and from which it receives a conſiderable ſhare of its nouriſhment. The leaves are angular, and the flowers, which grow in an umbel, have each five oblong patent petals, with their points incurved. The fruit is a globoſe berry, of a dark colour, having one cell incloſing four or five large ſeeds, convex on one ſide and angulated on the other. The leaves are ſaid to be heating, drying, and aſtringent, but ſeldom given inwardly; they are often applied to iſſues, to keep them cool and free from inflammations. The berries are frequently given by the common people as a febrifuge, they purge up and down. A gum that diſtils from the trunk of the ivy-tree when cut is reckoned a notable cauſtic, and is recommended by ſome to take ſpots and freckles from out the face.

Ground-IVY, *Glechoma*, in botany, a low plant, which grows naturally on banks, &c. in many parts of England. The leaves are roundiſh, an inch broad, hairy, and crenated; the flowers grow on the top of the ſtalks, and are monopetalous and ringent, moderately large, and of a blue colour. The ſeeds are oval, and four in number, which are contained in the cup.

This plant is of a pungent, nitrous, and earthy taſte, and is very opening, diſcutient, and vulnerary: it is not only preſcribed in all diſtempers of the lungs and breaſt, but alſo accounted good in obſtructions of the viſcera, for which reaſon it paſſes for an hepatic, ſplenetic, diuretic, and nephritic. Ray affirms, that the powder ſnuffed up the noſe will cure a violent head-ach. The powder is much recommended by Willis for obſtinate coughs, eſpecially of young children. It is common about London to infuſe the dried leaves in malt liquor, and then it goes by the name of gill ale.

IXIA, in botany, a genus of triandrious plants, whoſe flower cup is an oblong, perſiſtent, bivalvular ſpatha; the corolla conſiſts of ſix oblong, equal, ſpear-ſhaped petals. The fruit is an oval three cornered capſule, and containing three compreſſed cells, which are filled with roundiſh ſeeds.

IXORA, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped; the tube is cylindric, very long and ſlender; the limb is plane, and divided into four ovate ſegments. The fruit is a roundiſh bilocular berry, containing two ſeeds, convex on one ſide and angular on the other.

JYNX, the wry-neck, in ornithology, a genus of birds of the pye-kind, the beak of which is ſmooth, and the noſtrils hollowed: the tongue is very long, and of a rounded form, reſembling a worm: the toes are four in number, two before and two behind.

Of this genus there is only one known ſpecies, called, from its ſingular manner of twiſting its head about, the wry-neck. It is about the ſize of a lark, and is called by authors jynx, torquilla, turbo, &c.

K.

K, A double conſonant, and the tenth letter of the alphabet. It is borrowed from the Greek K, Kappa, which was made from the old Hebrew Caph, when reverted. It was but little uſed among the Latins; and Priſcian looked on it as ſuperfluous, and ſays it was never uſed except in words borrowed from the Greek; we ſeldom, it is true, meet with it in Latin authors, except in *kalendæ*.

The letter is formed in the voice by a guttural expreſſion of the breath through the mouth, together with a depreſſion of the lower jaw, and opening of the lips and teeth. It has much the ſame ſound as the hard ſound of C, and is generally uſed before *i*, *e*, and *n*, in the beginning of words, where the hard ſound of *c* is formed, as in *kill*, *ken*, *knave*, &c.

K is alſo a numeral letter, denoting 250, according to this following verſe;

K quoque ducentos & quinquaginta tenebit

When it had a ſtroke at top $\bar{K}$, it ſtood for 250,000.

KAABA, or CAABA. See CAABA.

KABBALA, or CABBALA. See CABBALA.

KÆMPFERIA, in botany, a genus of plants, whoſe flower is monopetalous, with a long ſlender tube, and a plane limb divided into ſix ſegments; it hath a membraneous filament, topped with a linear anthera. The fruit is a roundiſh trigonal capſule, with three cells, which are filled with a number of ſeeds.

KALI, glaſſwort, in botany, a plant with ſpreading, reddiſh, pretty thick branches; oblong, narrow, pointed, fleſhy leaves, like thoſe of the houſeleeks; and imperfect flowers in the boſoms of the leaves, followed each by one ſeed ſpirally curled and incloſed in the cup. It is annual, and grows wild on the ſea-coaſts in the ſouthern parts of Europe, particularly of the Mediterranean.

This herb is very juicy, in taſte bitteriſh, and remarkably ſaline. The expreſſed juice, and infuſions or decoctions of the leaves, are ſaid to be powerfully aperient and diuretic; and in this intention have by ſome been greatly recommended in hydropic caſes: half a dram of the juice is reckoned a ſufficient doſe. But the kali is principally regarded, on account of its yielding copiouſly, when burnt, the fixed alkaline ſalt called ſoda, or ſouda: an impure ſoda is prepared from it about Montpelier, where the plant is ſaid to be cultivated for this uſe in the ſalt marſhes; and a purer kind at Alicant in Spain, from a ſomewhat different ſpecies of kali. The ſalt called kelp, prepared among ourſelves from different marine plants, contains an alkali of the ſame kind, but more impure.

Of the aſhes of kali is made ſope, glaſs, alkali-ſalt, pot-aſh, &c. See SOPE, GLASS, &c.

The method of preparing it is this: when dry, they burn it in certain pits, dug in the ground, which are cloſe covered up with earth, ſo that no air can come at the fire: by this means the matter is not only reduced to aſhes, but made into a very hard ſtone, like rock ſalt, which they are forced to break with hammers to get it out. The beſt ſort is in little dry ſtones, of a bluiſh grey colour, and full of little eyes or holes. See the articles ALCALI and SALSOLA.

KALMIA, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped, the tube is cylindrical, and the limb cut into five ſegments, which ſpread open the fruit in a ſubgloboſe depreſſed capſule, having five cells, which contain a great number of ſmall ſeeds.

KAOLIN, the name of one of the two ſubſtances which are the ingrediente of China-ware. The other, which is called petuntſe, is eaſily vitrifiable, and this kaolin is ſcarce at all ſo. Whence the fire compoſes, from a mixture of them both, a ſemi-vitrification, which is China-ware.

Mr. Reaumur had an opportunity of examining this ſubſtance, not in its native ſtate, but only in form of ſmall bricks, made out of a paſte of the powder of the native kaolin and water. He found it of a white colour, and ſprinkled all over with fine glittering particles; but theſe he did not judge to be fragments of a different ſubſtance mixed among the maſs, as are the ſmall flakes of talc in our clays and ſands; but that the whole maſs was compoſed of ſome ſtone reduced to powder and made into a paſte with water, and that theſe larger ſpangles were only coarſer particles of the powder; the examination of which he promiſed himſelf would diſcover what the ſtone was of which they were formed. And this was the more worthy a diligent enquiry, ſince the petuntſe might eaſily be ſupplied by many of our own earths and ſands; nothing being required of that but a ſubſtance eaſily running into a white glaſs. But the difficulty of vetrifying this other ingredient renders it a thing much more difficult to be ſupplied by one of the ſame nature among ourſelves. The compariſon of theſe with other mineral ſubſtances ſoon proved that they were of the nature of talc; or, in other words, that kaolin was talc powdered, and made up into a paſte with water. And, to be aſſured whether the whole maſs was talc powdered, or any thing elſe with a mixture of talc, he ſeparated the particles of the kaolin by water, and found the ſmall ones wholly the ſame with the larger, and that the larger, when reduced to powder alone, made with water a paſte wholly the ſame with the kaolin.

It is well known that the fragments of talc have a great reſemblance to the pearly part of ſome ſhell-fiſhes; and hence unqueſtionably has ariſen the opinion of porcelain being made of ſea-ſhells; ignorant perſons having ſeen the talc or kaolin, and taken it for ſhelly matter. Talc has not yet been ſucceſsfully uſed in any of our European manufactures of porcelain; but it is eaſy to ſee, from many unanſwerable reaſons, that ſince China porcelain is made of a mixture of vitrifiable and unvitrifiable matter, nothing is ſo likely to ſucceed with us, in the place of the laſt of theſe, as talc.

1. We know no ſubſtance in the foſſil world ſo difficult to reduce to glaſs as talc, which, if put into the ſtrongeſt of our fires, in a crucible, is not to be vitrified, nor even calcined. 2. We know no ſubſtance which keeps ſo much brightneſs after having paſſed the fire as talc, or is of ſo pure a white; whence we may alſo learn that it is not to the petuntſe alone, that the China ware owes its whiteneſs, but that the kaolin is inſtrumental to the giving it that colour. 3. Talc is tranſparent, and in ſome degree keeps its tranſparency after the action of the moſt violent fire. If we are to make porcelain of a vitrifiable and an unvitrifiable matter, mixed together, yet it is neceſſary that the unvitrifiable matter ſhould retain its tranſparency, otherwiſe it would obſcure the maſs; and talc is therefore the only known ſubſtance qualified for this purpoſe. Perſons who have been at the China works, ſay, that the porcelain is made of equal quantities of petuntſe and kaolin, and it is therefore a juſt and exact ſemi-vitrification. 4. Talc is well known to have a great flexibility and toughneſs, and, as it is found to preſerve this even after it has paſſed the fire, it is very probable, that it is owing to this property of the kaolin, that the China-ware is ſo much leſs brittle than glaſs. *Mem. Acad. Par.*

KEBLA, an appellation given by the Mahometans to that part of the world where the temple of Mecca is ſituated, towards which they are obliged to turn themſelves when they pray.

KECKLING, among ſailors, certain pieces of rope wound about the cable, to prevent it from being fretted or chafed by the ſhip's ſtem or bow.

KEDGE-ANCHOR, among ſailors, a ſmall anchor uſed in harbours and rivers, either to remove the ſhip from one place to another, by the help of certain tranſporting ropes, called warps, or to keep her ſteady as ſhe rides at anchor, eſpecially at the turn of the tide, when ſhe may come ſo nigh it as to entangle the flooks of it with her cable, if not kept from it by the kedge. See the article ANCHOR.

KEEL, in naval architecture, the principal piece of timber firſt laid upon the blocks, which ſupports the whole fabric of a ſhip in the ſame manner as the back-bone ſuſtains the human body. When this cannot be had of a ſufficient depth in one piece, there is a ſtrong thick plank faſtened to the bottom, called the falſe-keel, which alſo ſerves to ſave the bottom of the main keel.

The keel of a ſhip of war is generally compoſed of four pieces bolted together lengthwiſe, and clinched. See the article SHIP-BUILDING.

The keels of the ſhips of war of the ancients were defended by pieces of wood nailed on the bilges, on either ſide, to prevent the keel from receiving damage when the ſhip was firſt launched into the water, or afterwards ſtruck againſt any rock or ſand: theſe were called χελευσματα, in Latin *cunei*; according to Ovid,

Jamque labant cunei, ſpoliataque tegminæ ceræ
Rima patet.

The wedges break, and loſing all its wax,
A hole lets in the water.

KEEL is alſo a veſſel employed in divers parts of Northumberland to bring coals down the rivers to the ſhips into which they diſcharge them for tranſportation: theſe veſſels reſemble the coal barges on the river Thames, but are generally much ſtronger.

KEELSON, or KELSON, is the upper part of the keel, or that part of it which is within the ſhip. It is laid over the floor timbers, and bolted through them to the keel; this is alſo, like the keel, of three or four pieces of timber ſcarfed together. See the article SHIP-BUILDING.

KELP, a fixed ſalt, or particular ſpecies of pot-aſh, procured by burning the weed kali. See the article KALI.

KERMES, round reddiſh-brown grains, about the ſize of peas; found in Spain, Italy, and the ſouthern parts of France, adhering to the branches of the ſcarlet oak.

Theſe grains appear, when freſh, full of minute reddiſh ova, or anamalcules, of which they are the nidus, and which in long keeping, change to a browniſh red powdery ſubſtance. They are cured by ſprinkling with vinegar before exſiccation: this this prevents the excluſion of the ova, and kills ſuch of the animals as are already hatched; which would otherwiſe become winged inſects, and leave the grain an empty huſk.

Freſh kermes yield upon expreſſion a red juice, of a light pleaſant ſmell, and a bitteriſh, ſubaſtringent, ſomewhat pungent, taſte: this juice, or ſyrup, made from it, is brought from the ſouth of France, and ſometimes made uſe of as mild reſtringents and corroborants. An elegant cordial confection, for theſe intentions, is prepared in the ſhops, by diſſolving in the heat of a water-bath, ſix ounces of fine ſugar in ſix ounces by meaſure of damaſk roſe water, then adding three pounds of the juice of kermes warmed and ſtrained, and after the whole has grown cold, mixing in half a ſcruple of oil of cinnamon: this confection is taken from a ſcruple to a dram or more; either by itſelf, or in juleps, with which it mingles uniformly, without injuring their tranſparency. The dried grains, if they have not been too long kept, give out, both to water and to rectified ſpirit, the ſame deep red colour, and nearly the ſame kind of ſmell and taſte, with thoſe of the expreſſed juice.

KERMES MINERAL.—The kermes mineral was a preparation of Glauber, which the king of France bought of M. de la Ligerie, and made public in 1720. That receipt was in the following form: Take a pound of Hungarian antimony, broken into thin pieces, according to the direction of its ſpicula; four ounces of nitre, fixed by charcoal; and a pint of rain water: boil them two hours; then filtre the warm liquor, and, when it cools, the kermes precipitates. The ſame antimony undergoes the ſame operations with the remaining liquor, to which, three ounces of fixed nitre, and a pint of water, are added. In a third boiling, two ounces of nitre, and a pint of water, are to be added to the former lixivium. The kermes thus obtained is about a drachm, which after being well edulcorated by waſhing it in water, and burning ſpirit of wine on it, is dried for uſe.

Mr. Geoffroy ſhews, by many experiments, that the kermes is the reguline part of the antimony, joined to a ſort of hepar ſulphuris. He teaches us a much eaſier way of preparing this medicine, thus: Mix intimately the fine powder of two parts of antimony, and one of any fixed alkaline ſalt; melt theſe materials in a crucible; then having powdered them while hot, boil them two hours in a large quantity of water; after this, paſs the hot liquor through paper, receiving it into a veſſel, in which there is hot water; the kermes ſeparates when it cools. The groſſer parts, which do not paſs through the paper, are to be boiled again, and filtrated again; and the operation is to be repeated a third time, by which ſix or ſeven drachms of kermes may be got out of every ounce of antimony. He ſays, he has ſeen effects, like to thoſe of mild kermes from antimony, reduced to ſuch a fine powder, that none of the ſhining ſpicula are to be ſeen; and that the magiſtery of antimony, made by pouring ſpirit of nitre, or aqua regia, on the powder of antimony, and then edulcorating the maſs with water, has the ſame effects as kermes. *Mem. de l'Acad. des Sciences.*

Half a grain, or a grain, of this powder, given every three or four hours, produces no violent effects; but, by increaſing the doſe, it may be made to vomit, purge, and ſweat. Some commend this medicine as the moſt univerſal reſolvent and deobſtruent; aſſuring us, that it almoſt infallibly cures pleuriſies, peripneumonies, aſthmas, catarrhs, anginæ, ſmall-pox, and many other diſeaſes. Others are as poſitive, that it heats and thickens the blood, thereby increaſing obſtructions, and is particularly hurtful in all inflammatory diſeaſes.

This preparation was famous in France, and known by the name of poudre des Chartereux, becauſe a Carthuſian monk, who got it from M. de la Ligerie, firſt brought it into vogue. See *Hiſt. de l'Acad. des Sciences*, 1720, and the memoirs for the ſame year, where it is ſaid that Glauber was looked upon as the firſt inventor of this remedy.

Its effect, like that of many other antimonial preparations, is very various, which is frequently owing, as Mr. Geoffroy obſerves, to the different manner and care of making it. He adds, that the more the kermes contains of a regulus eaſily revivified, the more it proves emetic. He alſo ſhews how to make a cinnibar with kermes and mercury, and to diſengage the vitriolic acid from the kermes. See *Mem. de l'Acad. des Sciences*, 1734.

KERNING, among ſalt makers, the cryſtallizing of ſalt. See SALT.

KESTRIL, or KASTRIL, in ornithology, the yellow legged falcon, with a brown back, a ſpotted breaſt, and a rounded tail, with a broad black faſcia towards the end. It is a very beautiful bird, about the ſize of a pigeon, and very bold. It is known among authors, by the names of tinnunculus and cenchris; and is alſo called in Engliſh, the ſtannel or windhover.

KETCH, in the marine, a veſſel with two maſts, viz. a main and mizen maſt.

The principal uſe of this ſort of ſhips is to bombard a place, being properly furniſhed with mortars,

tars, bombs, carcaſes, &c. for this employment, and built remarkably ſtrong to encounter the ſhock of firing ſhells for a continuance.

KETMIA, in botany, a genus of plants, called by Linnæus, hibiſcus. See the article Hibiscus.

KETTLE-Drum, in the art of war. See the article Drum.

KEVELS, in ſhip-building, a ſort of frame compoſed of two pieces of wood thruſt into a third, which is bolted to the inſide of the ſhip: the uſe of which is to faſten ſome rope to, but more particularly the main and fore ſheets. See the article Sheet.

KEY, *Clavis*, a well known inſtrument for opening and ſhutting the locks of doors, cheſts, bureaus, and the like. See Lock.

Key, in muſic, a certain fundamental note, or tone, to which the whole piece, be it in concerto, ſonata, cantata, &c. is accommodated, and with which it uſually begins, but always ends. See the article Cleff.

Key is alſo uſed for an index, or explanation of a cipher. See Cipher.

Keys likewiſe denote thoſe little pieces in the fore part of an organ, ſpinnet, or harpſichord, whereby the jacks are played, ſo as to ſtrike the ſtrings of the inſtrument, and wind is given to the pipes by raiſing and ſinking the ſucker of the ſound-board.

Key-Stone *of an Arch*, or *Vault*, that placed at the top or vertex of an arch, to bind the two ſweeps together.

KIDNEY-Bean. See the article Phaseolus.

KIDNIES, *Renes*, in anatomy, two pretty ſolid, glandular bodies, ſituated in the poſterior part of the cavity of the abdomen, on each ſide of the lumbar vertebræ, between the laſt falſe ribs and oſſa ilium.

The right kidney lies under the great lobe of the liver, and is conſequently lower than the left, which lies under the ſpleen. The figure of the kidney reſembles that of a large bean; being convex on one ſide, and concave on the other; the concave ſide is turned to the vertebræ, and the convex the oppoſite way. Their length anſwers to the diſtance between the laſt falſe rib and os ilium; they are about half as broad as long, and half as thick as broad.

The deſcending aorta and inferior vena cava lie between the kidnies, pretty cloſe to the bodies of the vertebræ and to each other; the artery being on the left hand, and the vein on the right. Each of theſe large veſſels ſends out, tranſverſely, towards each ſide, commonly one capital branch, which enters the ſinus and depreſſion of the kidney by ſeverol ramifications. Theſe veſſels were by the ancients called emulgent arteries and veins, but are rather renal veins and arteries. There are more than one of each kind, particularly in the arteries; ſometimes on one ſide only, and ſometimes on both.

The left renal artery is ſhorter than the right, becauſe the aorta lies neareſt the left kidney; and the left renal vein is longer than the right, becauſe the vena cava lies furtheſt from the left kidney. The veins lie more anteriorly than the arteries.

Each renal artery is ſurrounded by a nervous net work called plexus renalis, furniſhing a great number of filaments to the kidnies, that come partly from the ſemilunar ganglions of two great ſympathetic nerves, and partly from the plexus hepaticus and ſplenicus. This renal plexus alſo ſends filaments round the renal veins.

The kidnies are ſurrounded by a very looſe, membranous, and cellular covering called membrana adipoſa, which is not a duplicature of the peritonæum, the true membranous lamina of which covers only the foreſide of the kidnies. The only coat they have is the cellular ſubſtance, which likewiſe inveſts the renal arteries and veins like a vagina.

The proper membrane of the kidnies conſiſts of two laminæ, between which there is alſo a very fine cellular ſubſtance, as appears upon blowing.

The external lamina is very thin, adhering cloſely to the internal by means of the cellular ſubſtance. The internal lamina penetrates every where into the ſubſtance of the kidney.

In children the convex ſurface is divided into ſeveral lobes, almoſt as in oxen and calves; and in grown perſons we ſometimes obſerve the ſame inequalities.

The blood-veſſels entering the kidnies are ramified every way; and theſe ramifications ſend out the capillary branches all the way to the ſurface thereof: ſometimes theſe two ramifications penetrate to the membrana adipoſa, communicating there with the adipoſe veins and arteries.

The proper membrane having ſurrounded the kidney all the way to the ſinus, joins the veſſels there, and accompanies all their ramifications through the body of the kidney, like a capſula, and contributes in part to form the pelvis and calices or infundibula.

Sometimes, but rarely, a conſiderable veſſel goes in or comes out from the convex ſurface of the kidney, and then there is a depreſſion by which the proper membrane enters, and communicates with that portion which goes in by the ſinus.

The tunica adipoſa terminates at the ſinus in the interſtices between the ramifications.

There are three kinds of ſubſtances in the kidney, that may be ſeen when it is cut through the great curviture: 1. An exterior, which is thick, granulated, and in a manner cortical. 2. A middle ſubſtance, which is medullary and radiated, called ſtriata, ſulcata, or tubularis; and 3. An inner ſubſtance, which is only a continuation of the ſecond, and terminates on the inſide by papillæ; and for that reaſon is called papillaris.

By the microſcope the cortical ſubſtance is obſerved to be of a ſpongy, granulated, and waving texture, of a bright whitiſh grey-colour; and likewiſe great numbers of ſmall red corpuſcles, more or leſs round, are to be ſeen, and diſpoſed almoſt like bunches of currants.

The other two ſubſtances are but one and the ſame maſs, of a more reddiſh colour; the convex ſide of which riſes into narrow tubercles, lodged in the ſame number of cavities. The radiated ſtriæ are afterwards continued to the papillary portion, and the papillæ form ſo many centers of theſe radii, oppoſite to the the tubercles. The medullary ſubſtance has arterial and venal arches that ſend capillaries on all hands, and its colour is more or leſs red.

The papillæ are often a little paler than the medullary ſubſtance. They are ten or twelve in number, reſembling the ſame number of cones, with verp broad baſes and obtuſe apices. At the point of each papilla may be ſeen ſeveral very ſmall holes, through which little drops run, when the papillæ are compreſſed; being little drops of urine that are filtered and diſcharged at theſe orifices.

Each papilla lies in a kind of calyx or infundibulum, which opens into a common cavity, called the pelvis. This cavity in men is not uniform, but diſtinguiſhed into three portions, each of which contains a certain number of infundibula, together with the papillæ that lie therein.

At the place where theſe infundibula ſurround the baſes of the papillæ, they ſend productions into the medullary ſubſtance of the kidney, which accompany the blood-veſſels, and ſerve for vaginæ to all the vaſcular arches, and their different ramifications, quite as far as the ſurface of the kidney.

KILDERKIN, a liquid meaſure, containing two firkins. See Firkin.

KINDRED, in law, perſons related to another, whereof the law of England reckons three degrees or lines, viz. the deſcending, aſcending, and collateral line.

On there being no kindred in the deſcending line, the inheritance paſſes to the collateral one. See Inheritance.

KING, in the general acceptation of the word, is a perſon who has a ſupreme authority, with the power of levying taxes, making laws, and enforcing an obedience to them: but in England, which is a limitted monarchy, the power of the king is greatly reſtrained; which is ſo far from diminiſhing his honour, that it adds a glory to his crown; for while other kings are abſolute monarchs over innumerable multitudes of ſlaves, the king of England has the diſtinguiſhed glory of governing a free people, the leaſt of whom is protected by the laws: he has great prerogatives and a boundleſs power in doing good; and is at the ſame time only reſtrained from acting inconſiſtently with his own happineſs, and and that of his people. He has all the enſigns of royalty, and all the marks of ſovereignty: but while he has the power of making treaties, of ſending and receiving ambaſſadors, of conferring titles of honour, creating privy counſellors, officers of ſtate, and judges, and may raiſe men and arms both for ſea and land, he cannot force his ſubjects to maintain them, or raiſe one tax by his ſole authority: he has the privilege of coining money, but he cannot force the meaneſt ſubject to part with his property; he can pardon a criminal, but he cannot put a ſubject to death, till he is condemned by his peers: he may at his pleaſure call, continue, prorogue, and diſſolve parliaments, and without his royal aſſent no bill in parliament can paſs into a law; yet he can neither act contrary to law, nor make new laws by his ſole authority; on the contrary, he may even be ſued and caſt in his own courts.

King's-Bench, in law, a court held in Weſtminſter-Hall, ſo called, in regard the king is ſuppoſed to ſit in perſon as judge of the courr, and may do ſo whenever he pleaſes; wherefore all writs, &c. in this court are made returnable *coram nobis*, and not *coram juſticiariis noſtris*, as in the Common-Pleas.

The judges are the lord chief juſtice, and three other puny juſtices. Here are principally determined matters relating to the crown and the peace. When any are aggrieved by an order of juſtices or quarter ſeſſions, they have recourſe hither: the rights of election of mayors, baliffs, conſtables, &c. are, upon mandamus's ſetttled here, and prohibitions iſſued to ſtay proceedings in the eccleſiaſtical, admiralty, or other inferior court. Here any debt or contract may be ſued for, as well as in any other court, and may as expeditiouſly proceed.

Books of Kings, two canonical books of the Old Teſtament, ſo called becauſe they contain the hiſtory of the kings of Iſrael and Judah from the beginning of the reign of Solomon, down to the Babyloniſh captivity, for the ſpace of near ſix hundred years. The firſt book of Kings contains the latter part of the life of David, and his death; the flouriſhing ſtate of the Iſraelites under Solomon, his building and dedicating the temple of Jeruſalem, his ſhameful defection from the true religion, and ſudden decay of the Jewiſh nation after his death, when it was divided into two kingdoms: the reſt of the book is taken up in relating the acts of four kings of Judah, and eight of Iſrael.

The ſecond book which is a continuation of the ſame hiſtory, is a relation of the memorable acts of ſixteen kings of Judah, and twelve of Iſrael, and the end of both kingdoms, by the carrying of the ten tribes captive into Aſſyria by Salmaneſer, and the other two into Babylon by Nebuchadnezzar.

It is probable that theſe books were compoſed by Ezra, who extracted them out of the public records which were kept of what paſſed in that nation.

KING's-FISHER, *Iſpida*, in ornithology. See the article ISPIDA.

KIGGELARIA, in botany, a genus of plants of the diœcia claſs, producing male and female flowers; the corolla of both conſiſts of five lanceolated concave petals. The fruit is a coriaceous, round, rough capſule, containing a number of angulated ſeeds.

KINGSPEAR, the Engliſh name for the Aſphodelus of botaniſts. See ASPHODELUS.

KINK, a ſort of twiſt or turn in the cable, owing to its being very ſtiff or not well cleared at the time of its running out of the ſhip when the anchor is let fall from the bow.

KIRK, a Saxon term, ſignifying the ſame with church. See the article CHURCH.

KIRK-SESSIONS, an inferior church-judicatory, in Scotland, conſiſting of the miniſters, elders, and deacons of a pariſh.

KITCHEN-GARDEN, a piece of ground laid out for the cultivation of fruit, herbs, pulſe, and other vegetables uſed in the kitchen.

A kitchen garden ought to be ſituated near the ſtables, from whence the dung may be eaſily conveyed into it. The beſt figure for a kitchen-garden, and moſt convenient for culture, is either a ſquare or an oblong; theſe forms can moſt conveniently be divided and ſubdivided into right-angled pieces for each particular crop,' which cannot ſo well be done in an irregular figure: but what is of more conſideration, is the choice of a good ſoil, not too wet or too dry, but of a middling quality, eaſy to work, and by no means over-ſhadowed by trees, buildings, &c. ſo as to be entirely free to the ſun and air, except on the north ſide, where a diſtant plantation is very proper to preſerve the early crops from being damaged in the ſpring by the cold winds; but theſe plantations ſhould be not too near, or very large; for it has been found where kitchen-gardens are placed near woods, or large plantations, they have been much more troubled with blights in the ſpring than thoſe which have been more expoſed ——This ground ſhould be walled round, againſt which may be trained different ſorts of fruit-trees; the borders adjoining to them may be about eight or ten feet, which will give the roots of the trees liberty to extend, and alſo are of uſe on the ſouth ſide to raiſe many ſorts of early plants; and thoſe expoſed to the north, are ſerviceable for plants of later growth; avoiding thoſe ſorts which are deep rooted.

In the diviſion of the ground, it ſhould be laid out in quarters, according as the figure of it will admit: theſe quarters ſhould be proportioned to the whole; if they are too ſmall, much ground will be loſt in walks; and as the quarters ſhould be ſurrounded with eſpalier fruit-trees, the plants will draw up ſlender for want of a more open expoſure: the width of the walks ſhould alſo be proportioned to the ſize of the ground; theſe in a ſmall garden need not be above ſix feet wide; but in a larger one, ten feet is not too much. On each ſide of the walks that are not next the walls, ſhould be a border, about three or four feet wide, between it and the eſpalier; theſe are uſeful for raiſing various ſorts of ſmall herbs, ſallads, &c. which do not root too deep in the ground.

The quarters ſhould not be ſown or planted with the ſame crop two years together; but the crops ſhould be annually changed, or oftener, according to their time of duration.

One of the beſt ſheltered quarters (which ſhould be as near the ſtables as can be admitted) ſhould be appropriated for the hot-beds, for raiſing early melons, cucumbers, &c. and to theſe there ſhould be a paſſage from the ſtables, for the conveniency of wheeling or carting dung, for the above purpoſes.

Water is abſolutely neceſſary in a kitchen-garden; for, without its aid, numbers of culinary plants would periſh in hot dry ſeaſons; therefore, thoſe who lay out a kitchen-garden, would do well to conſider this important article.

The principal points of the general culture conſiſts in well digging and manuring the ſoil, which, if of a ſtrong nature, ſhould be meliorated with ſand, horſe-dung, aſhes, rotten wood, and ſuch light ſubſtances; but if it is light, or ſandy, then the dung of hogs, cows, loam, &c. is the beſt manure for it. As for the other neceſſary directions, they are deſcribed under the articles of the ſeveral kinds of *Kitchen*-PLANTS, which ſee.

KITE, *Milvus*. See MILVUS.

KNAVE, in old law books, an appellation given to a man ſervant, or even to a male child.

KNEE, *Genu*, in anatomy, the articulation of the thigh and leg-bones. See the articles FEMUR, TIBIA, PATELLA, &c.

The two principal motions of this joint are flexion and extenſion: in the former of theſe the leg may be brought to a very acute angle with the thigh, by the condyles of the thigh-bone being round and ſmoothed ſo far backwards; and in performing this, the patella is pulled down by the tibia. When the leg it to be extended, the patella is drawn upwards, and the tibia forwards, by the extenſor-muſcles, which, by means of the protuberant joint, and this thick bone with its ligament, have the chord with which they act, at a conſiderable angle, and therefore act with advantage; but, in order that the body may be ſupported by a firm perpendicular column, they are reſtrained by the poſterior croſs-ligament, from pulling the leg farther than to a ſtraight line with the thigh; and when this is done, the thigh and leg are almoſt as immoveable as if they were one continued bone: but when the joint is a little bent, the poſterior ligament is relaxed, and the patella not tightly braced; therefore the ſuperficial cavities of the tibia will allow this bone to be moved a little to either ſide, or with a ſmall rotation; which is done by the motion of the external cavity backwards and forwards on the internal, which ſerves as a kind of axis. The rotation of the leg outwards is of great advantage to us in croſſing our legs on ſeveral neceſſary occaſions; though it is wiſely ordered by providence, that this motion ſhould not be very great, ſince this would have occaſioned frequent luxations. While all theſe motions are performing, the only part of the tibia that moves immediately on the condyles, is only ſo much as is within the cartilaginous rings, which by the thickneſs of their outſides, make the cavities of the tibia more horizontal, by raiſing their external ſide, where the ſurface of the tibia ſlants downwards; by which means the motions of this joint are more equal and ſteady than they would otherwiſe have been. The cartilages are fitted to do this good office in the different motions and poſtures of the member, by being capable of changing a little their ſituation; and this alſo contributes to make the motions larger and quicker.

KNEE *of the Head*, in ſhip-building, a large piece of timber fayed and bolted to the ſtem, on which the figure or image of the head reſts: by reaſon of its great breadth at the upper part, it is compoſed of ſeveral pieces: it is let into the head, and faſtened to the ſhip's bows on each ſide by knees, which are called the cheeks of the head: it is alſo ſcarfed to the head of the fore-foot, and faſtened to the ſtem by a knee, called a ſtandard, in the form of a K. This is commonly called cut-water by ſeamen. See the article CUT-WATER.

KNEES, in ſhip-building, certain crooked pieces of timber, one leg or arm of which is bolted to the beams, and the other to the ſhip's ſide. They are either lodging or hanging: the hanging knees are fayed up and down; and the others fore and aft on the inſide of the ſhip, reſting upon clamps.

KNIGHT, *Eques*, among the Romans, a perſon of the ſecond degree of nobility, following immediately that of the ſenators.

KNIGHT, a perſon who, on account of ſome martial feat, or notable action, is by the king raiſed to a rank above a gentleman.

KNIGHT alſo denotes a perſon admitted into any order, with certain marks of diſtinction, as the knights of the garter, of the elephant, of the thiſtle, of the Holy Ghoſt, of Malta, &c.

KNIGHT-ERRANT, a pretended order of chivalry, much talked of in old romances, being a kind of heroes that travelled the world in ſearch of adventures, redreſſing wrongs, reſcuing damſels, and taking all occaſions of ſignalizing their proweſs. Of this kind of knights was Don Quixote, the hero of a celebrated romance, known by that name. This romantic bravery of the old knights was heretofore the chimera of the Spaniards.

KNIGHTS *of the Shire*, or KNIGHTS *of Parliament*, in the Britiſh polity, are two knights or gentlemen of eſtate, who are elected, on the king's writ, by the freeholders of every county, to repreſent them in parliament.

The qualifications of a knight of the ſhire, is to be poſſeſſed of 600 l. per ann. in a freehold eſtate. Their expences during their ſitting, were, by a ſtatute of Henry VIII. to be defrayed by the county; but this is now ſcarce ever required.

KNIGHT-MARSHAL, an officer in the king's houſhold, who has juriſdiction and cognizance of any tranſgreſſion within the king's houſhold and verge; as alſo of contracts made there, whereof one of the houſe is party.

KNIGHT-HEADS, in ſhip-building, two ſtrong pieces of timber placed an each ſide of the deck of a merchant-ſhip. They are uſed to ſupport the windlaſs, or roller, by which the cable is wound into the ſhip; and as each of them is formed of two pieces, they can be occaſionally taken down and ſeparated, to remove the cable from off the windlaſs, which reſts upon, and turns round in the knight-heads: they are otherwiſe called bits, and in this ſenſe the upper-part only is called the knight-head.

KNOTTING, among ſailors, untwiſting the ends of a rope, and interweaving them curiouſly amongſt each other, ſo as to form knots of various ſhapes; amongſt which they number the diamond-knot, the wall-knot, or walnut, the roſe-knot, bowline-knot, double diamond-knot, &c.

KNOWLEDGE, according to Mr. Locke, conſiſts in the perception of the connection and agreement, or diſagreement and repugnancy of our ideas: and ſo it ſtands contradiſtinguiſhed from ignorance.

The whole ſtock of our knowledge conſiſts of four heads, namely, identity or diverſity, relation, co-exiſtence, and real exiſtence.

As to the identity or diverſity of our ideas, it is the firſt act of the mind to perceive its own ideas, and, ſo far as it perceives them, to know what each is, and thereby find out their difference.

The next kind of agreement or diſagreement in our ideas, is co-exiſtence or non-co-exiſtence in the ſame ſubject, and this belongs particularly to ſubſtances.

The fourth ſort is that of actual exiſtence, agreeing to any idea. The mind becomes poſſeſſed of truth ſeveral ways, which conſtitute ſo many different ſpecies of knowledge. Thus, when the mind has a preſent view of the agreement or diſagreement of any of its ideas, or relation they bear to one another, this is called actual knowledge.

Secondly, a man is ſaid to know a propoſition, when having once evidently perceived the agreement or diſagreement of the ideas of which it conſiſts, and ſo lodged it in his memory, the mind aſſents to it without any heſitation, whenever it comes to be reflected on again; and this may be called habitual knowledge. Of this there are two ſorts; the one conſiſts of ſuch truths laid up in the memory, as, whenever they occur to the mind, it actually perceives their relation by an immediate view: the other is of ſuch truths of which the mind having been convinced, it retains the memory of the conviction, without the proofs.

KOLLOW, the name of a black kind of earth found in ſeveral parts of the kingdom.

KORAN, or ALCORAN. See ALCORAN.

KOS, in Jewiſh antiquity, a meaſure of capacity, containing about four cubic inches: this was the cup of bleſſing, out of which they drank when they gave thanks after ſolemn meals, like that of the paſſover.

KUTUCHTA, among the Calmuc-Tartars, the name of their high-prieſt, or ſovereign pontiff; formerly only the deputy of the delai-lama, or high-prieſt of the Tartars, but at preſent independant on him.

L.

L, A ſemi-vowel, or liquid, making the eleventh letter of the alphabet. It was derived from the old Hebrew Lamed, or Greek Lambda λ. It is ſounded by intercepting the breath between the top of the tongue and the fore part of the palate, with the mouth open, and makes a ſweet ſound, with ſomething of an aſpiration; and therefore the Britons and Spaniards uſually doubled it, or added an *h* to it, in the beginning of words, as in *llan*, or *lhan*, a temple, ſounding nearly like *fl*, &c. In Engliſh words of one ſyllable, it is doubled at the end, as *tell*, *bell*, *knell*, &c. but in words of more ſyllables than one, it is ſingle at the end, as *evil*, *general*, *conſtitutional*, &c. It is placed after moſt of the conſonants in the beginning of words and ſyllables, as *black*, *glare*, *ad-le*, *ea-gle*, &c. but before none. Its ſound is clear in *Abel*, but obſcure in *able*, &c.

L, among the ancients, was a numeral letter, and is ſtill ſo in the Roman cyphering, and denotes fifty according to the verſe,

Quinquies L denos numero deſignat habendos.

being half a C, which ſignifies a hundred, and was formerly written thus E. When a line was added at top L̄, it ſtood for 50,000.

LA, in muſic, the ſyllable by which Guido denoted the laſt ſound of each hexachord; if it begins in C, it anſwers to our A; if in G, to E; and if in F, to D.

LABARUM, in Roman antiquity, the ſtandard borne before the Roman emperors; being a rich purple ſtreamer, ſupported by a ſpear.

LABDANUM, or LADANUM, a reſinous juice, exuding upon the leaves of a ſmall ſhrub, which grows plentifully in Candy, and ſome of the other iſlands of the Archipelago. It is collected by lightly bruſhing the ſhrub, in the ſummer heats, with a kind of rake, having ſeveral ſtraps or thongs of leather fixed to it, inſtead of teeth: the unctuous juice adheres to the thongs, and is afterwards ſcraped off with knives. The ſhrub is ſaid to be very plentiful alſo in Spain, but it does not appear that any labdanum is brought from thence.

Two ſorts of this reſin are met with in the ſhops. The beſt, though very rare, is in dark-coloured black maſſes, of the conſiſtence of a ſoft plaſter, growing ſtill ſofter on being handled: the other is in long rolls coiled up, much harder than the preceding, and not ſo dark. The firſt has commonly a ſmall, and the laſt a very large admixture of fine ſand, which in the labdanum examined by the French academy, amounted to three fourths of the maſs. It is ſcarcely indeed to be collected pure, independently of deſigned abuſes; the duſt blown on the plant by winds from the looſe ſands among which it grows, being retained by the tenacious juice.

Labdanum has been ſometimes exhibited as a reſinous corroborant and reſtringent, but principally employed in external application and perfumes: the ſoft kind makes an uſeful ingredient in the cephalic and ſtomachic plaſters of the ſhops. This ſort has a very agreeable ſmell, and a lightly pungent bitteriſh taſte: the hard is much weaker; and the common means of purifying theſe kinds of ſubſtances, though they ſeparate the ſandy matter mixed with it, render it weaker ſtill.

LABEL, in heraldry, a fillet uſually placed in the middle along the chief of the coat, without touching its extremities. Its breadth ought to be a ninth part of the chief. It is adorned with pendants; and when there are above three of theſe, the number muſt be ſpecified in blazoning.

This is a kind of addition to the arms of a ſecond brother, to diſtinguiſh him from the firſt, and is eſteemed the moſt honourable of all differences.

Label, in law, a narrow ſlip of parchment hanging from a deed, writ, or other writing, in order to hold the appending ſeal.

Label *of a Circumferentor*, a long thin braſs-ruler, with a ſight at one end, and a center hole at the other; chiefly uſed with a tangent line, to take altitudes.

LABIA, the lips, in anatomy. See the article Lips.

LABIAL Letters, thoſe pronounced chiefly by means of the lips. See Letter.

LABIATED Flowers, monopetalous flowers, conſiſting of a narrow tube, with a wide mouth, divided into two or more lips. See Botany and Flowers.

LABORATORY, or Elaboratory. See Elaboratory.

LABOUR, in general, denotes a cloſe application to work or buſineſs. Among ſeamen, a ſhip is ſaid to be in labour when ſhe rolls and tumbles very much, either a-hull, under ſail, or at anchor. It is alſo ſpoke of a woman in travel, or child-birth. See Delivery.

LABOURING, in the marine, a violent rolling or pitching, ſo as to endanger the maſts and hull, by carrying away or ſpringing the former, and ſtraining the latter, ſo as to occaſion a leak or other diſaſter.

LABYRINTH, in anatomy, the internal cavity of the ear, ſo called from its ſinuoſities and windings. See the article Ear.

Labyrinth, in gardening, a winding, mazy, and intricate turning to and fro, through a wilderneſs, or a wood.

LAC, Milk, among phyſicians, &c. See the article Milk.

LACCA, Lac, or Stick-Lac, improperly called gum-lac, in natural hiſtory, a concrete brittle ſubſtance, of a dark red colour; brought from the Eaſt-Indies incruſted on pieces of ſticks; internally divided into ſeveral cells; ſaid to be the reſinous juice of certain trees, collected by winged red inſects of the ant kind, impregnated with the tinging matter of the inſects, and by them depoſited either on the branches of the trees, or on ſticks faſtened in the earth for that purpoſe. In the cells are often obſerved ſmall red bodies, which appear to be the young inſects.

The tinging red animal matter of the ſtic-lac diſſolves both in water and rectified ſpirit, and appears to be of the ſame general nature with that of cochineal; like which it is made dull by alkalies, and brighter by acids, and turned to a ſcarlet by a ſolution of tin.

Seed Lac.—If the lac be broken in ſmall pieces, or grains, and infuſed in warm liquor, the remainder will appear of a tranſparent yellowiſh or browniſh colour, and, on raiſing the heat ſo as to make the water boil, melts and riſes to the ſurface, and is thence called ſhell-lac.

Artificial Lacca, or Lake, in painting, a white earthy body, as cuttle-fiſh bone, the baſis of alum, or chalk, tinged with ſome crimſon vegetable dye, ſuch as is obtained from cochineal or Braſil-wood, diſſolved or taken up by means of ſome alkaline ſalt, and precipitated on the earth by the addition of ſome acid.

Lake is uſed in all kinds of painting, except enamel; but particularly in oil, where it ſupplies the place of carmine. It is valuable both for its brightneſs and crimſon teint; which make it uſeful for carnations to the portrait painters; for ſkies to the landſcape or ſhip painters; and for flowers to thoſe who paint ſtill life. Its tranſparency in oil renders it alſo of great ſervice in glazing, as it is called, over vermilion; and in painting ſcarlet draperies, and the red parts of the lips; and its acquiring a dark hue, by this tranſparency, when uſed without the addition of any opake pigment, which gives it an unrivalled excellence in the ſhades of red draperies, or other ſimilar caſes. Notwithſtanding theſe qualities, lake is not at preſent univerſally approved; nor without reaſon; for there is a defect which makes it to be frequently rejected, where its uſe can be avoided. This defect is the uncertainty of its ſtanding, when prepared in that manner which moſt conduces to its perfection in other reſpects: for though ſome parcels will hold their colour entirely well, yet others prepared in the ſame manner, as far as art can aſſure it, will fly in a degree that makes the uſe of it deſtructive to any painting: and if this defect be effectually remedied, as it may be by ſecuring the tinging particles by gums, from all attacks of the air; yet this is generally at the expence of the brightneſs and tranſparency; the earth, which is the baſis of the pigment, being locked up by the gums, and rendered incapable of being combined intimately with, or imbibing the oil. Beſides the perfections of lake, which it may have in common with other colours, there is yet another that relates only to itſelf, which is the inclining to the ſcarlet hue, that makes it more valuable for almoſt all the purpoſes to which it is applied; and where this quality, joined to the others, happens to be found in it, there is ſcarcely any limits to be ſet on its value with eminent painters of any kind.

Lake was moſt probably firſt made from the colour found in the grains of the ſtick-lac, from whence it ſeems to have taken its name; but it may be made from a great variety of ſubſtances which afford a crimſon tinge; though at preſent it is ſeldom prepared from any other than cochineal, ſcarlet rags, and Braſil-wood.

The beſt of what is commonly ſold is made from the colour extracted from ſcarlet rags, and depoſited on the cuttle-bone, which may be done in the following manner:

"Take a pound of the beſt pearl-aſhes, and having diſſolved them in two quarts of water, purify them by filtering through paper. Add then to this ſolution two more quarts of water; and having put in a pound of ſcarlet ſhreds, procured from the taylors, for they muſt be entirely clean, boil them in a pewter boiler made for that purpoſe, till the ſhreds appear to have wholly loſt their ſcarlet colour. Take them out of the ſolution, and preſs them well; dipping them after in water, and preſſing them again, that all the fluid they had imbibed may be got from them, which muſt be put back to the reſt. Take then another pound of the ſhreds, and repeat the like treatment of them in the ſame ſolution; as alſo a third and fourth pound. While this is doing, diſſolve a pound and half of cuttle-fiſh in a pound of ſtrong aqua-fortis, in a glaſs receiver, adding more of the bone, if it appear to produce any ebullition in the aqua-fortis; and having ſtrained off this ſolution through flannel, pour it into the other by degrees; obſerving whether it produces any efferveſcence on putting in the laſt quantity; which if it do in any great degree, more of the cuttle-fiſh bone muſt be diſſolved in aqua-fortis; and the ſolution very gradually added, till no ebullition appear to be raiſed by it in the mixture. If this be properly managed, the fluid will ſoon become clear and colourleſs, and the tinging particles extracted from the ſhreds, together with the cuttle-fiſh bone, will ſubſide to the bottom, and form a crimſon ſediment, which is the lake. The water muſt then be poured off; and two gallons of hard ſpring-water muſt be put to the lake, and well ſtirred about to mix them; which, being likewiſe poured off, after the lake has again ſettled to the bottom, muſt be replaced by another two gallons; and the ſame method muſt be repeated four or five times; but if hard water cannot be procured, or the lake appear too purple, half an ounce of allum ſhould be added to each quantity of water before it be uſed. When the lake is thus ſufficiently freed from the ſalts, it muſt have the water drained from it in a filter, covered with a linen cloth, which has been ſo worn as to have no knap or down remaining on its ſurface. After the lake has drawn to a proper dryneſs, it muſt be dropped, on clean boards, by means of ſticks of elder, mountain-aſh, or other hollow wood, cut into the form of pens, and ſuffered to dry; when the drops will appear in the form of little cones or pyramids."

If this lake be of a deeper colour than be deſired, the proportion of ſcarlet ſhreds may be diminiſhed; or if it be wanted yet deeper, they may be increaſed.

This lake, when the proceſs ſucceeds well, will be very bright; and will ſtand equally to any whatever: but it is not ſo tranſparent and fit for glazing as that where earth of alum is the baſis.

Orange LAKE.—This lake is the tinging part of annatto precipitated together with earth of alum. It is of a very bright orange colour, and would work well with either oil or water, but cannot be depended upon, when uſed either of thoſe ways, for ſtanding long. It is, however, a very fine colour for varniſh painting, where the fear of flying is out of queſtion; and is alſo of an admirable good effect for putting under cryſtal for the imitation of the vinegar garnet; for which purpoſe it has been uſed with great ſucceſs.

The manner of preparing this lake is as follows:

"Take of the beſt annatto four ounces, and of pearl-aſhes one pound. Put them together into a gallon of water, and boil them half an hour; and then ſtrain the ſolution through paper.—Make, in the mean time, a ſolution of a pound and a half of alum, in another gallon of water: and mix it gradually with the ſolution of the pearl-aſhes and annatto; obſerving to ceaſe any farther addition when the fluid becomes colourleſs, and no further ebullition enſues on the commixture. Treat the ſediment or precipitated matter, then, in the ſame manner as has been before directed for other kinds of lake; only this need not be formed into drops, but may be dried in ſquare bits or round lozenges."

LACHRYMAL, in anatomy, an appellation

given to ſeveral parts of the eye, from their ſerving to ſecrete the tears.

The lachrymal gland is ſituated in the orbit above the ſmaller angle, and its excretory ducts under the upper eye-lid: theſe are much more eaſily demonſtrated in the eye of an ox, than in a human one.

The lachrymal caruncle is ſituated in the larger angle, or canthus, ſerving to direct the tears to the two puncta lachrymalia; which are ſituated in the ſame angle, at the extremities of the tarſi or cartilages, and terminate in the lachrymal ſaccus, the naſal canal, and in the noſe itſelf. See the article Eye.

LACHRYMALIS Fistula, in ſurgery and medicine. See Fsstula.

LACHRYMATORY, in antiquity, a veſſel wherein were collected the tears of a deceaſed perſon's friends, and preſerved along with the aſhes and urn.

LACONISM, λακονισμος, in matters of ſtyle, a ſhort, pithy obſervation or ſaying; ſo called from the Lacedæmonians, who were remarkable for the conciſeneſs of their diſcourſe. See Style.

LACTEA, or Via Lactea, the ſame with galaxy. See Galaxy.

LACTEAL Vessels, in anatomy, long ſlender tubes for the conveyance of the chyle from the inteſtines to the common reſervatory. See the articles Chyle.

LACTIFEROUS Plants, in botany, ſuch plants as abound with a milky juice, as the lithymalus, ſonchus, and lettuce.

LACUNÆ, in anatomy, certain oſcula or orifices, proceeding from the glandulæ ſubſtratæ in the vagina, and often ſo large as to admit a briſtle. Their uſe is to ſecrete a fluid for lubricating the vagina, and ſtimulating to venery.

LACUNAR, in architecture, an arched roof or ceiling, more eſpecially the planking or flooring above porticos and piazzas.

LADANUM, or Labdanum, in pharmacy. See the article Labdanum.

LADY'S Bedstraw, a plant called by botaniſts gallium. See Gallium.

Lady's Comb, a plant otherwiſe called ſcandix. See the article Scandix.

Lady's Finger, a ſpecies of vulneraria. See the article Vulneraria.

Lady's Mantle, the Engliſh name of alchimilla. See Alchimilla.

Lady's Smock, the Engliſh name of cardamine. See Cardamine.

Lady's Slipper, the Engliſh name of the cypripedium. See Cypripedium.

Lady's Traces, a name by which ſome call orchis. See Orchis.

Lady-Day, in law, the 25th of March, being the annunciation of the holy virgin. See the article Annunciation.

LAGOECIA, round-headed cummin, in botany, a genus of plants, the flower of which conſiſts of five petals, very ſhort, and bicornate: there is no pericarpium, the ſeed, which is ſingle, being contained in the cup.

This plant has neither the ſmell, appearance, or taſte of cummin; its ſmell being more like that of the carrot.

LAGOPHTHALMIA, in ſurgery, an everſion and gaping of the eye-lids, otherwiſe called ectropium. See the article Ectropium.

LAIR, among ſportſmen, the place where the deer harbour by day. This term is alſo uſed to ſignify a place where cattle uſually reſt under ſome ſhelter: by which means the ground generally becomes enriched with their dung.

LAKE, a collection of waters contained in ſome cavity in an inland place, of a large extent, ſurrounded with land, and having no communication with the ocean.

Lakes may be divided into four kinds. 1. Such as neither receive nor ſend forth rivers. 2. Such as emit rivers, without receiving any. 3. Such as receive rivers, with emitting any. And, 4. Such as both receive and ſend forth rivers.

Of the firſt kind, ſome are temporary, and others perennial: moſt of thoſe that are temporary owe their origin to the rain, and the cavity or depreſſion of the place in which they are lodged: thus in India there are ſeveral ſuch lakes made by the induſtry of the natives, of which ſome are a mile, and ſome two in circuit; theſe are ſurrounded with a ſtone wall, and being filled in the rainy months, ſupply the inhabitants in dry ſeaſons, who live at a great diſtance from ſprings or rivers. There are alſo ſeveral of this kind formed by the inundations of the Nile and the Niger; and in Muſcovy, Finland, and Lapland, there are many lakes formed, partly by the rains and partly by the melting of the ice and ſnow; but moſt of the perennial lakes, which neither receive nor emit rivers, probably owe their riſe to ſprings at the bottom, by which they are conſtantly ſupplied.

The ſecond kind of lakes, which emit, without receiving rivers, is very numerous. Many rivers flow from theſe as out of ciſterns; where their ſprings being ſituated low within a hollow place, firſt fill the cavity, and make it a lake, which not being capacious enough to hold all the water, it overflows and forms a river: of this kind is the Wolga, at the head of the river Wolga; the lake Odium, at the head of the Tanais; the Adac, from whence one branch of the river Tigris flows; the Ozero, or White Lake, in Muſcovy, is the ſource of the river Shackſna. The great lake Chaamay, which emits four very large rivers, which water the countries of Siam, Pegu, &c. the Menau, the Aſa, the Caipoumo, and the Laquia, &c.

The third ſpecies of lakes, which receive rivers, but emit none, apparently owe their origin to thoſe rivers, which in their progreſs from their ſource, falling into ſome extenſive cavity, are collected together; and form a lake of ſuch dimenſions, as may loſe as much by exhalation, as it continually receives from theſe ſources: of this kind is that great lake improperly called the Caſpian ſea; the lake Aſphaltites, alſo called the Dead ſea; the lake of Geneva, and ſeveral others.

Of the fourth ſpecies, which both receive and emit rivers, we reckon three kinds, as the quantity they emit is greater, equal, or leſs than they receive. If it be greater, it is plain that they muſt be ſupplied by ſprings at the bottom; if leſs, the ſurplus of the water is probably ſpent in exhalations; and if it be equal, their ſprings juſt ſupply what is evaporated by the ſun,

Lakes are alſo divided into thoſe of freſh water, and thoſe of ſalt. Dr. Halley is of opinion, that all great perennial lakes are ſaline, either in a greater or leſs degree; and that this ſaltneſs encreaſes with time: and on this foundation he propoſes a method for determining the age of the world.

Large lakes anſwer the moſt valuable purpoſes in the northern regions, the warm vapours that ariſe from them moderating the pinching cold of thoſe climates; and what is ſtill a greater advantage, when they are placed in warmer climates at a great diſtance from the ſea, the exhalations raiſed from them by the ſun, cauſe the countries that border upon them to be refreſhed with frequent ſhowers, and conſequently prevent their being barren deſarts.

LAMA, the ſovereign pontiff, or rather god, of the Aſiatic Tartars, inhabiting the country of Barantola. The lama is not only adored by the inhabitants of the country, but alſo by the kings of Tartary, who ſend him rich preſents, and go in pilgrimage to pay him adoration, calling him *Lama-Congiu*, i. e. God the everlaſting father of heaven. He is never to be ſeen but in a ſecret place of his palace, amidſt a great number of lamps, ſitting croſs-legged upon a cuſhion, and adorned all over with gold and precious ſtones; where, at a diſtance, they proſtrate themſelves before him, it not being lawful for any to kiſs even his feet. He is called the great lama, or lama of lamas, that is prieſt of prieſts. And to perſuade the people that he is immortal, the inferior prieſts, when he dies, ſubſtitute another in his ſtead, and ſo continue the cheat from generation to generation. Theſe prieſts perſuade the people, that the lama was raiſed from death many hundred years ago, that he has lived ever ſince, and will continue to live for ever.

LAMB, in zoology, the young of the ſheep-kind. See the article SHEEP.

LAMENTATIONS, a canonical book of the Old Teſtament, written by the prophet Jeremiah. The two firſt chapters of this book are employed in deſcribing the calamities of the ſiege of Jeruſalem. In the third, the author deplores the perſecutions he himſelf had ſuffered. The fourth turns upon the deſolation of the city and temple, and the miſfortune of Zedekiah. The fifth chapter is a prayer for the Jews in their diſperſion and captivity; and at the end of all, he ſpeaks of the cruelty of the Edomites, who had inſulted Jeruſalem in her miſery. The four firſt chapters of the Lamentations are an abecedary, every verſe or couplet beginning with one of the letters of the Hebrew alphabet, in the alphabetical order. The ſubject is of the moſt moving kind, and the ſtile throughout lively, pathetic, and affecting. "Did we ever find, ſays Dr. South, ſorrow flowing forth in ſuch a natural prevailing pathos, as in the Lamentations of Jeremy? One would think, that every letter was wrote with a tear; that every word was the noiſe of a breaking heart; that the author was a man compacted of ſorrows, diſciplined to grief from his infancy; one who never breathed but in ſighs, nor ſpoke but in a groan."

LAMIÆ, in heathen mythology, a kind of dæmons, in the form of women, ſaid to have devoured children. See DÆMON.

LAMINÆ, in phyſiology, the thin plates whereof many ſubſtances conſiſt.

LAMIUM, dead nettle, in botany, a genus of plants, the flower of which conſiſts of one labiated and ringent petal: the ſeeds are four, triangular, and contained in the bottom of the cup.

The flowers of this plant are ſaid to be good in the fluor albus dyſentery, and ſcrophulous diſorders. The herb is aperient, emollient, and vulnerary.

LAMMAS-DAY, a feſtival celebrated on the firſt of Auguſt by the Romiſh church, in memory of St. Peter's impriſonment.

LAMP, λαμπας, a veſſel containing oil, with a lighted wick. See OIL, FLAME, FIRE, &c.

LAMPADARY, an officer in the ancient church of Conſtantinople, ſo called from his employment, which was to take care of the lamps, and to carry a taper before the emperor or patriarch when they went to church, or in proceſſion.

LAMPAS, LAMPERS, or LAMPRASS, among farriers, a ſwelling and inflammation in the roof of a horſe's mouth, ſo called becauſe it is cured by burning with a lamp or hot iron, in which operation great care ſhould be taken not to touch the bone.

LAMPERN, in ichthyology, a ſpecies of petromyzon, with a ſingle row of little teeth in the verge of the mouth, beſide the lower large ones.

It grows to about a foot long, though moſt of thoſe uſually caught are under that ſtandard. See the article PETROMYZON.

LAMPREY, *Lampetra*, another ſpecies of petromyzon, with about twenty rows of teeth. It grows to two feet and a half, or more, in length. It is caught in ſome large rivers near the ſea, but is much leſs frequent than the former ſpecies.

LANCEOLATED LEAF, one reſembling a ſpear's point.

LANCET, a chirurgical inſtrument, ſharp-pointed, and two edged, chiefly uſed for opening veins in the operation of phlebotomy, or bleeding; alſo for laying open abſceſſes, tumors, &c.

LAND, in a limited ſenſe, denotes arable ground. See the articles EARTH, SOIL, and HUSBANDRY.

It is alſo uſed for meadow-ground, paſture, wood, commons, &c. See the articles MEADOW, PASTURE, &c.

LANDSKIP, or LANDSCAPE, in painting, the view or proſpect of a country, extended as far as the eye will reach.

LANGUAGE, an aſſemblage of expreſſions among any people, whereby to communicate their thoughts to each other. And this, change or caprice has eſtabliſhed at firſt; ſo that uſage is the rule of a language, nor has reaſon any thing to do therein, unleſs to ſtudy or teach it, ſuch as it is. Here then commences grammar, which only furniſhes reflections, called rules, to which the manners of ſpeaking, uſed in that language, may be reduced.

Uſage may be divided into good and bad. The difference between theſe is, that the one is better eſtabliſhed than the other. In dead languages, that which makes the good uſage, is the writings of the beſt authors in that language; and thoſe authors are allowed the beſt, who wrote when the ſtate was in its greateſt glory. Thus the age of Auguſtus being the moſt diſtinguiſhed period in the Roman hiſtory, we call that good Latin which is conformable to the manners of ſpeaking uſed by authors who wrote within fifty years before, or after the reign of that emperor. As to the living languages, the good uſage, or mode, is that which obtains amongſt the moſt eminent perſons, whether as to quality and authority, or as to learning, and the reputation of writing well.

There is found a conſtant reſemblance between the genius of each people, and the language they ſpeak. Thus the Greeks, a polite but voluptuous people, had a language perfectly ſuitable, full of delicacy and ſweetneſs. The Romans, who ſeemed only born to command, had a language noble, nervous, and auguſt; and their deſcendants, the Italians, are ſunk into ſoftneſs and effeminacy, which is as eaſily perceivable in their language, as in their manners. The language of the Spaniards is full of that haughtineſs which conſtitutes the diſtinguiſhing character of the people. The French, who have a world of vivacity, have a language that runs extremely briſk and lively. And the Engliſh, who are naturally blunt, thoughtful, and of few words, have a language exceeding ſhort, conciſe, and ſententious. See the articles GREEK, LATIN, ITALIAN, SPANISH, FRENCH, and ENGLISH.

The diverſity of languages is generally allowed to have taken its riſe from the confuſion at the Tower of Babel, both by Jews, Chriſtians, and Mahometans; but the manner in which this diverſity was effected, is ſtill in diſpute among the learned.

As to the point of antiquity and priority among languages, that too has been extremely controverted. The Egyptians and Phrygians diſputed concerning the antiquity of their languages: the Arabs diſpute the point of antiquity with the Jews; but theſe, jealous even to exceſs of the honour of their nation, poſitively inſiſt that the Hebrew tongue, ſuch as is found in the Holy Scriptures, is the primative language, and that ſpoken by the firſt man; while others contend that the Hebrew, Chaldee, and Arabic, are only dialects of the original tongue: however that be, the Arabic is held to be the moſt copious of all languages. See the articles ARABIC, CHALDEE, HEBREW, EGYPTIAN, and PHRYGIAN, &c.

Languages are divided into 1. Original, or mother tongues, as the Hebrew and Arabic in the eaſt (Kircher adds the Cophtic); the Teutonic and Sclavonic in the weſt. And Du Jon maintains the Gothic to be the mother of the Teutonic tongues, namely, thoſe ſpoken in the north; and ſome add the Biſcayan or Bas-Briton, as the mother tongue of the Celtæ or Gauls.

2. Derivative languages, which are thoſe formed out of a mixture of ſeveral others, as French, Latin, &c.

Learned, or dead languages, are thoſe which only ſubſiſt in books, and which muſt be learned by the rules of grammar, as the Greek, Hebrew, Syriac, and Chaldee.

Living languages are thoſe ſtill ſpoken in ſome country, or other, and which may be learned by converſation. The moſt popular among theſe are the French, Italian, Spaniſh, and Engliſh.

Speech is a privilege peculiar to man, and he is likewiſe furniſhed with organs proper for forming an articulate voice: hence it is eaſy to conceive, men might form a ſettled and uniform language, by only affixing an idea to a word, and making others acquainted with it. And it is alſo eaſy to conceive, that the connection betwixt moſt words and things being perfectly arbitrary, they may be changed at different places, at different times, and by different perſons. And it is not very unlikely, that variety of capacities and inclinations, the different occaſions people have to expreſs themſelves, different terms of imagination, the eaſe people find in delivering themſelves rather one way than another, the ſorgetting old words, the many new things met with requiring new names, ſtrangers ſettling among natives, &c. it is not unlikely, that theſe, and many other cauſes, ſhould occaſion an alteration in living languages.

When all mankind inhabited the ſame country, and kept up a commerce with each other, living through many ages, it is no great wonder that the common language was continued amongſt them, without any conſiderable alterations, till after the flood; ſince Noah himſelf was born not long after Adam's death, and a great many antediluvians living in Noah's time might have converſed with Adam and Eve ſome hundred years. Since all the world was then deſtroyed, except Noah and his family, the tongue ſpoken by this patriach muſt be the only remaining language, and which might be eaſily handed down to his poterity, as long as they dwelt in the ſame country. But when, before their parting, they attempted to build a city and tower, God conſounded their language, inſomuch, that not being able to underſtand each other, they were forced to ſeparate, and leave the building unfiniſhed.

LANGUED, in heraldry, is applied to ſuch animals whoſe tongues appear out of their mouths, being of a different colour from that of the body.

LANGUOR, a faintneſs or relaxation of the members, owing either to a want or decay of ſpirits.

LANIGEROUS, among herbaliſts, trees that bear ſuch a woolly or downy ſubſtance as is commonly contained in the katkins of the willow, &c.

The word is derived from the Latin, *lana*, wool, and *gero*, to bear.

LANIUS, the butcher-bird, in ornithology, a ſpecies of falcon, with black legs, a grey back, and variegated belly.

LANNAR, or LANNERET, the blue-legged falcon, with oblong black and white ſpots. It is a very beautiful bird, about the ſize of a common crow, very bold, and uſually kept for the diverſion of hawking.

LANTANA, in botany, a genus of didynamious plants whoſe flower is monopetalous, with a cylindraceous tube and a plane quadrifid limb; the ſtamina are four very ſmall filaments, topped with roundiſh antheræ: the fruit is a roundiſh unilocular drupe, which includes a bilocular nut, containing two oblong kernels.

LANTERN, or LANTHORN, a well known invention for ſhewing light in the night.

The word is derived from the French *lanterne*, which ſignifies the ſame thing.

LANTERN, in architecture, a little dome raiſed over the roof of a building, to give light, and ſerves as a crowning to the fabric.

LANTERNISTS, a denomination aſſumed by the academicians of Thoulouſe.

LANUGO, the ſoft down of plants like that growing on the fruit of a peach-tree; whence ſuch plants are termed lanuginous.

LAPATHUM, the dock, in botany, a perennial plant bearing numerous imperfect flowers ſet in double cups; the outermoſt of which conſiſts of three ſmall green leaves, the inner of three larger reddiſh ones, which become a covering to a gloſſy triangular ſeed.

LAPATHUM *acutum folio plano*, ſharp-pointed wild dock, with long, narrow, acuminated leaves, not curled about the edges, and the ſeed-covers indented and marked with little tubercles. The roots are of a browniſh colour on the outſide, and of a yellowiſh within, which grows deeper in drying.

The roots of the ſharp-pointed dock have a bitteriſh aſtringent taſte, and no remarkable ſmell: the roots of the other common wild docks are nearly of the ſame quality, equally diſcover their aſtringent matter both to the taſte and by ſtriking an inky blackneſs with a ſolution of chalybeat vitriol, and have been often ſubſtituted in our markets for thoſe of the ſharp-pointed kind; which laſt are generally, and, ſo far as can be judged from their taſte, juſtly accounted the moſt efficacious. They are ſuppoſed to have an aperient and laxative, as well as an aſtringent and corroborating virtue; approaching in this reſpect to rhubarb, but differing widely in degree, their ſtypticity being greater, and their purgative quality, if really they have any purgative quality all, far leſs. They ſtand recommended in habitual coſtiveneſs, obſtructions of the viſcera, ſcorbutic and cutaneous maladies: in which laſt intention, fomentations, cataplaſms, or unguents of the roots have been commonly joined to their internal uſe: in many caſes, the external application alone is ſaid to be ſufficient. A decoction of half an ounce, or an ounce, of the freſh roots, or of a dram or two of the dry roots, is commonly directed for a doſe.

LAPATHUM *rhabarbarum monachorum*, monks rhubarb, garden patience, with large, broad, acuminated leaves; reddiſh branched ſtalks; the leaves that cover the ſeeds unindented, and a tubercle on one of them: the root is of a yellow colour, with red veins, approaching in appearance to rhubarb.

This root is ſuppoſed to poſſeſs the virtues of rhuin an inferior degree. It is obviouſly more aſtringent than rhubarb, but comes very far ſhort of it in purgative virtue, though given, as uſually directed in double its doſe; nauſeating the ſtomach, without producing any conſiderable evacuation. It communicates a deep yellow tincture both to water and ſpirit.

LAPIDARY, an artificer who cuts precious ſtones. See the articles GEM and DIAMOND.

LAPIDARY STYLE, denotes the ſtyle proper for monumental or other inſcriptions; being a ſort of medium between proſe and verſe. The jejune and brilliant are equally to be avoided.

LAPIDESCENT, that which has the faculty of turning bodies to a ſtony nature.

LAPIS, in general, is uſed to denote a ſtone of any kind. See STONE.

LAPPA, burdock, in Tournefort's ſyſtem, the ſame with the arctium of Linnæus. See the article ARCTIUM.

LAPSA, denotes a patron's neglect or omiſſion to preſent to a church within ſix months after it becomes vacant. When, after a vacancy, the patron does not preſent in ſix months, the ordinary has the next ſix months to collate to the benefice; and if he does not preſent within that time, the metropolitan has farther ſix months to do it in; and if he ſhould fail in doing it in his time, thenext ſix months devolve to the crown.

LAPSANA, nipplewort, in botany, a genus of plants whoſe flower is compound, imbricated, and uniform; conſiſting of a number of hermaphrodite florets, each of which are monopetalous, ligulated, and quinquedentated: it hath no pericarpium; but the ſeeds, which are ſolitary, oblong, and three cornered, are placed in the ſquamæ of the calyx.

LAQUEUS, in ſurgery, a kind of ligature ſo contrived, that when ſtretched by any weight, or the like, it draws up cloſe. Its uſe is to extend broken or disjointed bones, to keep them in their places when they are ſet, and to bind the parts cloſe together.

LARCENY, in law, a felonious carrying away another perſon's goods; and this, according to the value of the things ſtolen, is either grand or petit larceny; the firſt being ſtealing effects above the value of 1 *s.* and the laſt ſuch as are either of that value, or under it: but where two perſons together ſteal goods to the value of only 13 *d.* it is grand larceny in both; and if one perſon, at different times, ſteal ſeveral different things from the ſame perſon, which amount upon the whole to above 12 *d.* value, they may be joined in one indictment, and the offender found guilty of grand larceny; but this is very ſeldom practiſed; on the contrary, the jury, where the theft appears to be the firſt offence, frequently bring in their verdict as they lawfully may, that the things are not above 10 *d.* value, and by that means reduce the offence to petit larceny, though the offender may perhaps be indicted for ſtealing to the value of 30 or 40 *s.* and upwards. The crime of grand larceny is puniſhable with death, and that of petit larceny, only with the corporal puniſhment of whipping, &c.

LARES, certain inferior deities among the ancient Romans, who were the guardians of houſes; they were alſo ſometimes taken for the guardians of ſtreets and ways, and Tibullus makes them the guardians of the fields.

LARGO, in the Italian muſic, a ſlow movement, one degree quicker than the grave, and two than the adagio. See the articles ADAGIO and GRAVE.

LARIX, the Larch-tree, in botany, a genus of trees, whoſe leaves, which are long and narrow, are produced out of little tubercles, in form of a painter's pencil: the cones are produced at remote diſtances from the male flowers on the ſame tree: the male flowers are very like ſmall cones at their firſt appearance, but afterwards ſtretched out in length.

Theſe trees are propagated by ſeeds, which ſhould be ſown in the beginning of March, upon a bed of light ſoil, expoſed only to the morning ſun: or otherwiſe it may be ſown in pots or boxes of light earth, and placed near a hedge, where they may have the morning ſun only. The ſeed ſhould be covered about half an inch thick with fine light earth, and in very dry weather ſhould be gently refreſhed with water. In about ſix weeks, if your ſeeds were good, your plants will come up, at which time you ſhould carefully guard them againſt the rapacious birds, which would otherwiſe pull off the heads of the plants, as they thruſt themſelves out of the ground with their covers on them: and obſerve to refreſh them with water in dry weather, eſpecially if they are ſown in pots or boxes; as alſo to keep them clear from weeds, which, if ſuffered to grow among the young plants, will ſoon deſtroy them: nor ſhould they be too much expoſed to the ſun, or ſtrong winds; both which are very injurious to theſe plants while they are young: but in October you ſhould, if they are in boxes or pots, remove them into a ſituation where they may be defended from ſharp winds, which are ſometimes hurtful to them, while young; but afterwards they will endure the ſevereſt weather of our climate.

Theſe trees are very proper for the ſides of barren hills, where few other ſorts will thrive ſo well; nor is this tree very delicate in its ſoil, but will grow much better on poor, ſtrong, ſtony land, than in rich ground; and, during the ſummer, they appear very beautiful; but in autumn they caſt their leaves, whereby ſome people have been deceived, by ſuppoſing them dead, and have deſtroyed them.

From the wounded bark of this tree exudes the pureſt Venice turpentine; and on the body and branches of it grows the agaric, which is a drug uſed in medicine.

LARK, *Alauda*, in ornithology, a diſtinct genus of birds; the characters of which are theſe: the tongue, which is membranaceous and pointed, has a rim or margin round it; the beak is ſtraight and pointed; the two chaps equal in ſize; and the claw of the hinder toe longer than any of the other toes.

To this genus belong, 1. The ſky-lark, with the long winged feathers, variegated with white and brown. 2. The tit-lark, with a white line over the eyes. 3. The wood-lark, with the wings obliquely variegated with white. 4. The yellowbreaſted lark. 5. The ſnow-bird, or pied chaffinch, with the tail-feathers black, except the three lateral ones, which are white.

LARK-SPUR, delphinium, in botany. See the article DELPHINIUM.

LARMIER, in architecture, a flat ſquare maſſive member of the corniche, between the cymatium and ovolo.

The word is derived from the French *larmæ*, a tear, as it cauſes the rain-water to fall at a diſtance from the wall drop by drop like tears. See CORNICHE.

LARUS, the gull, in ornithology, a genus of the anſeres order of birds, thus characterized: the beak is ſtraight all the way, except juſt at the point, where it turns down; add to this, that it is obtuſe, not denticulated along the ſides, and its lower chap gibbous or protuberant underneath.

LARINGOTOMY, or BRONCHOTOMY. See the article BRONCHOTOMY.

LARYNX, in anatomy, forms the protuberance in the upper and anterior part of the neck, called pomum Adami: it is termed the head of the trachea arteria, being more prominent in men than in women. It principally conſiſts of five cartilages, as the cartilago thyroides, cricoides, two arytenoides, and the epiglottis; they are connected together by ligaments, and have muſcles, glands, and membranes belonging to them.

LASERPITIUM, laſerwort, in botany, a genus of umbelliferous plants; the general umbel is uniform; the proper flowers conſiſt each of five equal petals inflexo-cordated at the ends; there is no pericarpium. The fruit is oblong, and ſeperable into two parts, and is ridged with eight longitudinal membranes: the ſeeds are two in number, very large, oblong, and ſemi-cylindric, plane on one ſide, but on the other ornamented on the back and edges with four membranes.

All the ſpecies of laſerwort, if wounded, drop a very acrid juice, which turns to a reſinous gummy ſubſtance, very acrimonious. This was externally applied by the antients to take away black and blue ſpots that came by bruiſes or blows, as alſo to take away excreſcences; and was ſometimes preſcribed by ſome internally; though others have cautioned againſt uſing it this way on account of the violence of its acrimony.

LASSITUDE, *Laſſitudo*, in phyſic, a morbid ſenſation that comes on ſpontaneouſly without any previous motion, exerciſe, or labour. This is a frequent ſymptom in acute diſtempers. It ariſes either from an increaſe of bulk, a diminution of proper evacuation, or too great a conſumption of the fluid neceſſary to maintain the ſpring of the ſolids, or form a vitiated ſecretion of that juice.

The remedy in the firſt caſe is evacuation, and in the other a proper diet, or ſuch alterative medicines as influence ſuch a ſecretion.

LAST, in general, ſignifies the burden or load of a ſhip.

It ſignifies alſo a certain meaſure of fiſh, corn, wool, leather, &c. A laſt of cod-fiſh, white herrings, meal, and aſhes for ſope, is twelve barrels; of corn or rape-ſeed, ten quarters; of gun-powder, twenty-four barrels; of red-herrings, twenty cades; of hides, twelve dozen; of leather, twenty dickers of pitch and tar, fourteen barrels; of wool, twelve ſacks; of ſtock-fiſh, one thouſand; and of flax or feathers, one thouſand and ſeven hundred pounds weight.

LAST, in the marſhes of Kent, is applied to a court held by the twenty-four jurats, in which orders are given for the impoſing and levying of taxes for preſerving the ſaid marſhes.

LAST-HEIR, in law, he to whom lands come by eſcheat, for want of lawful heirs; who, in many caſes, is the lord of whom they are held, but in others the king.

LATERAL EQUATION, in algebra, a ſimple equation, whoſe root is only in one dimenſion.

LATERAN COUNCILS, thoſe councils held in the Baſilica of the Latin church at Rome. See the article COUNCIL.

There have been five councils held in this place, viz. in the years 1123, 1139, 1179, 1215, and 1513.

A LATERE, a term uſed to denote the qualifications of cardinals whom the pope ſends as legates into foreign courts, who are called legates a latere, as being aſſiſtants to his holineſs, and counſellors in ordinary; theſe are the moſt conſiderable of the three other legates, being ſuch as the pope commiſſions to take his place in councils, and ſo called in regard that he never gives this office to any but his favourites and confidants, who are always *a latere*, at his ſide.

De LATERE, legates who are not cardinals, but yet are entruſted with an apoſtolical legation.

LATH, in building, a long, thin, and narrow ſlip of wood, nailed to the rafters of a roof or ceiling, in order to ſuſtain the covering.

Theſe are diſtinguiſhed into three kinds, according to the different kinds of wood of which they are made, viz. heart of oak, ſap laths, and deal laths; of which the two laſt are uſed for ceilings and partitions, and the firſt for tiling only.

Laths are alſo diſtinguiſhed according to their length, into five feet, four feet, and three feet laths, though the ſtatute allows but of two lengths, thoſe of five, and thoſe of three feet, each of which ought to be an inch and a half in breadth, and half an inch in thickneſs, but they are commonly leſs.

LATH-BRICKS, bricks much longer than ordinary, uſed inſtead of laths, for drying malt; for which purpoſe they are extremely proper, as not being liable to catch fire, and retaining the heat much longer than thoſe of wood; ſo that a very

PLATE LXV

Facing Latitude.

Fig. 1. Latitude.

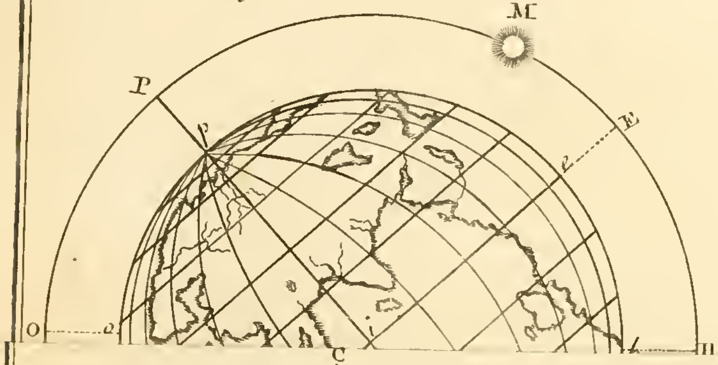
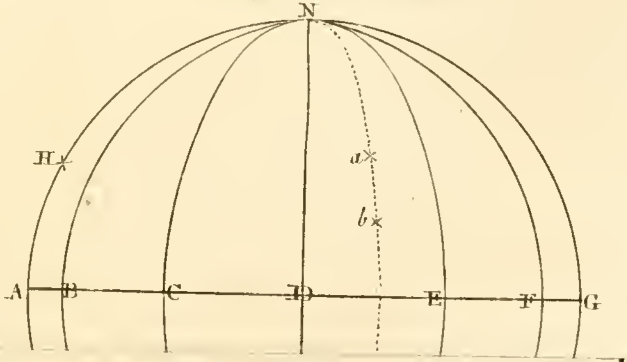


Fig. 2. Latitude.



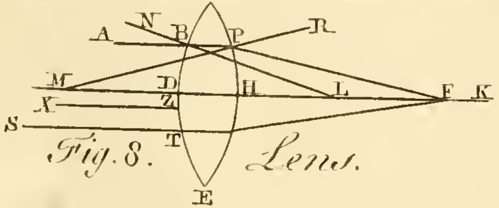


Fig. 8. Lens.

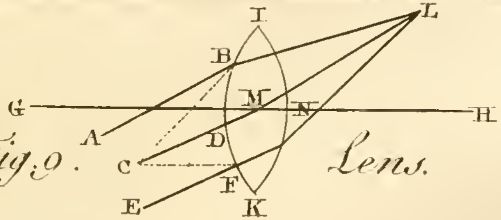


Fig. 9. Lens.

PLATE LXV

Facing Latitude.

Fig. 1. Latitude.

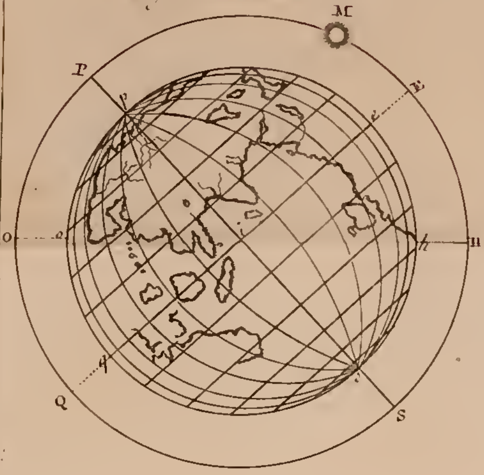


Fig. 2. Latitude.

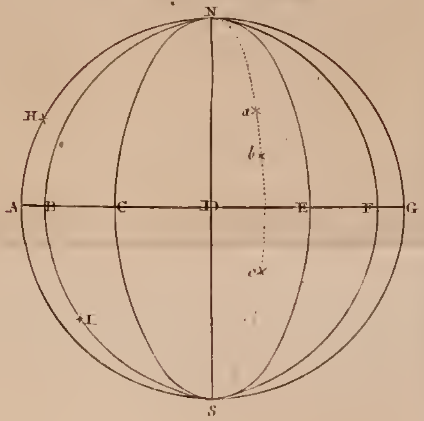


Fig. 3. Latitude.

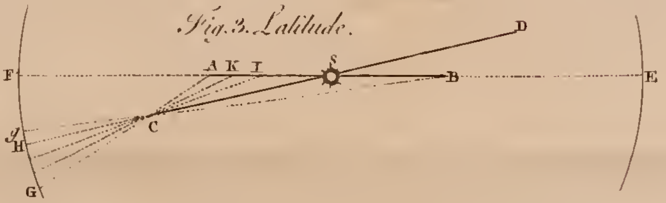
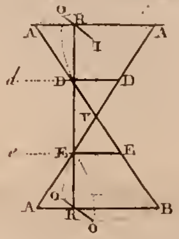
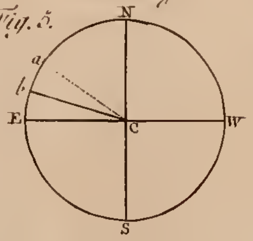


Fig. 4. Latus Transversum.



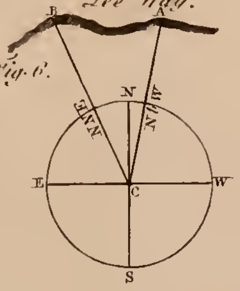
Lee Way.

Fig. 5.



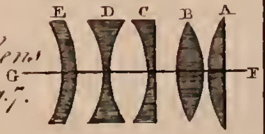
Lee Way.

Fig. 6.



Lens

Fig. 7.



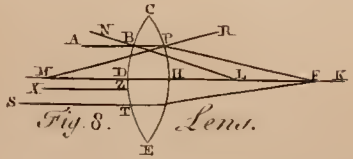


Fig. 8. Lens.

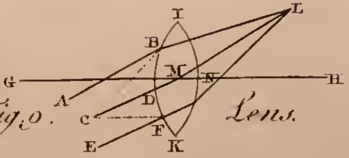


Fig. 9. Lens.

ſmall fire will ſerve, after they are once heated. See BRICK and MALT.

LATHE, an engine uſed in turning wood, ivory, and other materials. See plate LXIV. *fig.* 3. It is compoſed of two legs or ſtyles, *a a*, which are commonly about two feet ten inches high, on the upper part of which are faſtened two pieces of wood called cheeks, *b*, *b*, parallel to the horizon; between theſe are two pieces of wood, called puppets, *c*, *c*, made to ſlide between the cheeks, and to be fixed down at any point at pleaſure; near the upper end of one of theſe puppets is faſtened a ſtrong ſpike of tempered ſteel, *d*, and oppoſite to it, in the other, is an iron ſcrew, *f*; by theſe the piece to be turned is ſuſtained, and is turned round by means of the ſtring *m*, put round it, and faſtened above to the pliable pole *l*, and underneath to the treddle or board, *i*, moved with the foot; there is alſo a piece of wood between the cheeks, called a reſt, *e*, whoſe office is to reſt the tool upon, that it may lie in a ſteady poſition while the workman uſes it.

When turners perform heavy work, which the pole and treddle will not command, they uſe inſtead of theſe a wheel (*fig.* 4.) which is turned about, ſometimes with one and ſometimes with two handles, according to the weight of the work; its ſtring hath both its ends neatly faſtened together, and this being fixed in a groove round the edge of the wheel, and after being croſſed, put round a groove in the work, it is eaſily turned round with a ſwift and regular motion. This is the moſt expeditious method of working; for the ſpringing up of the pole makes an intermiſſion in the turning of the work, but with the wheel, it always turns the ſame way, ſo that the tool need never be taken off, unleſs it be to examine the work as it is doing.

Braziers, who turn pots, kettles, &c. have their lathe made in a different manner from that uſed by turners, as may be ſeen in *fig.* 5.

The puppets and reſts are much ſtronger than thoſe uſed by the turners: their edge-tools, which they call hooks, are alſo of a different ſhape from the chiſſels and other tools uſed by turners, as may be ſeen *ibid.* marked B 1, B 2, B 3, being bent backwards and forwards at the cutting end. And as the common turners work with a round ſtring made of gut, the braziers work with a flat leather thong, which wrapping cloſe and tight about the rowler of their mandril, commands it with the greater eaſe, and turns it more forcibly about.

Small work in metal is turned in an iron lathe, called a turn-bench, repreſented in *fig.* 6. When this is uſed, it is fixed in the chaps of a vice, and the work being fitted on a ſmall iron axis, with a drill-barrel fitted upon a ſquare ſhank near the end of it, the workman turns it round with a drill-bow, which he holds in his left hand, while he forms the moulding with a graver or other tool, which he holds in his right.

In turning oval or roſe-work, the common turner's lathe muſt be provided with the additional parts repreſented in *fig.* 7. which exhibits the whole machine with all its parts ready for working, A being the fore-puppet, with its apparatus; B, the hinder puppet; C, a hollow axis, turned into a ſcrew-faſhion to direct the weight D, by means of the nut E; and F, the ſupport of the tools, which may be raiſed or lowered at pleaſure.

LATHE, or LETH, as uſed in Kent and Suſſex, is part of a county, containing three or four hundreds.

LATHRÆA, great tooth-wort, in botany, a genus of plants, the corolla whereof conſiſts of a ſingle petal; the tube is longer than the cup; the limb is ringent and ventricoſe; the upper lip is concave, galeated, and broad, with a narrow crooked apex; the inferior one is leſs, and is reflex, obtuſe, and trifid; the fruit is a roundiſh elaſtic capſule, conſiſting of two valves, and containing only one cell; it is covered with a very large patent cup; the ſeeds are few and roundiſh.

LATHYRUS, chickling-pea, in botany, a genus of plants, the corolla of which is papilionaceous; the fruit is a very long, cylindric, or compreſſed, acuminated pod, conſiſting of two valves; the ſeeds are numerous, of a cylindric, globoſe, or ſomewhat angular figure.

LATIFOLIOUS TREES and PLANTS, ſuch as have broad leaves.

LATIN, a dead language, firſt ſpoken in Latium, and afterwards at Rome; and ſtill uſed in the Romiſh church, and among many of the learned.

This language is principally derived from the Greek, and particularly from the Eolic dialect of that tongue, though it has a great number of words which it borrowed from the languages of the Etruſci, Oſci, and other ancient people of Italy; and foreign commerce and wars, in courſe of time, added a great many more.

The Latin is a ſtrong nervous language, perfectly ſuitable to the character of the people who ſpoke it: we have ſtill works of every kind, admirably well written in the Latin, though there are vaſt numbers loſt. The Latin is more figurative than the Engliſh, more harmonious than the French, leſs copious than the Greek, leſs pompous than the Spaniſh, leſs delicate than the Italian, but cloſer and more nervous than any of them.

The Latin tongue was, for a while, confined almoſt wholly within the walls of Rome; nor would the Romans allow the common uſe of it to their neighbours, or to the nations they ſubdued: but, by degrees they in time became ſenſible of the neceſſity of its being generally underſtood, for the conveniency of commerce; and accordingly uſed their endeavours, that all the nations ſubject to their empire, ſhould be united by one common language, ſo that at length they impoſed the uſe of it, by a particular law for that purpoſe. After the tranſlation of the ſeat of the empire from Rome to Conſtantinople, the emperors of the Eaſt being always deſirous of retaining the title of Roman emperors, appointed the Latin to be ſtill uſed; but at length neglecting the empire of the Weſt, they abandoned all the care of the Latin tongue, and uſed the Greek. Charlemagne coming to the empire of the weſt, revived this language; but at length it gave way, and the French took place of the Latin.

The Latin, however, was prodigiouſly degenerated; for the incurſions of the Goths and Vandals, brought an inundation of foreign words into it. But that was not all: when it once got into the courts of juſtice, it was ſtill worſe handled; till at laſt, being introduced amongſt the monks, it was debauched to that degree, that it was almoſt ſcandalous to uſe it.

In this condition it was found at the Reformation, where Lud, Vives, Eraſmus, &c. began to open the way for its recovery; ſince which time, endeavours have been uſed to retrieve the pure Latinity of the Auguſtan age. See LANGUAGE.

LATISSIMUS, in anatomy, a large muſcle of the back, ſo called from its great breadth.

LATITAT, in law, a writ whereby all men in perſonal actions are called originally to the King's-bench: it is ſo called, as the defendant is ſuppoſed to lurk, and cannot be found in the county of Middleſex to be taken by bill; but is gone to ſome other county, to the ſheriff of which this writ is directed, commanding him to apprehend the defendant there.

LATITUDE, in geography, the diſtance of any place from the equator, meaſured in degrees, minutes, and ſeconds, upon the meridian of that place; and is either north or ſouth, according as the place is ſituated either on the north or ſouth ſide of the equator: Thus let *l* (plate LXV. *fig.* 1.) repreſent London, *p* the north pole, *e q* the equator; then will *p l e s* be the meridian of London, and the arch *e l* the latitude of London, which being equal to 51° 32′, the latitude of London, is ſaid to be 51° 32′ north.

The latitude of a place is always equal to the elevation of the pole above the horizon: Thus *l e*, the latitude of London, is equal to the arch *p o*, the elevation of the pole *p* above the horizon *h o*.—For the method of finding the latitude of a place from obſervations of the ſun or ſtars, ſee OBSERVATION.

Complement of the LATITUDE, in geography, is the number of degrees, minutes, and ſeconds, which, added to the latitude, make it equal to 90°: Thus the complement of the latitude of London is 38° 28′; for 38° 28′ added to 51° 32′ is equal to 90°.

The complement of the latitude is always equal to the elevation of the equator above the horizon, or the angle intercepted between the plane of the equator and the plane of the horizon. Thus let *l* (plate LXV. *fig.* 1.) be London, the latitude of London is the arch *e l*; the complement of the latitude is the arch *e h*, which meaſures the elevation of the equator *e q*, above the horizon *h o*, or the angle *e i h*, intercepted between the planes of the equator and horizon.

Circles of LATITUDE, in aſtronomy, are ſecondaries to the ecliptic, or circles drawn on the ſphere of the heaven, perpendicular to the ecliptic, and interſecting each other in the poles of the ecliptic.

LATITUDE *of a Star or Planet*, in aſtronomy, is its diſtance from the ecliptic in degrees, minutes, and ſeconds, meaſured on a circle of latitude drawn through that ſtar or planet, and may be either north or ſouth, as the object is ſituated either on the north or ſouth ſide of the ecliptic.

The ecliptic is drawn on the common celeſtial globes, by which we may ſee what conſtellations it paſſes through; there are alſo uſually ſix circles of latitude, which by their mutual interſections ſhew the poles of the ecliptic, as well as divide it into twelve equal parts, anſwering to the numbers of months in a year. Plate LXV. *fig.* 2. repreſents a celeſtial globe, where A G is the ecliptic, N the north, S the ſouth pole of the ecliptic, N A S, N B S, N C S, N D S, &c. are circles of latitude, or rather halves of them, which is as much as can be ſeen at one view upon the convex of the ſolid globe. The ſtar H is in ſo many degrees, minutes, and ſeconds of north latitude as the arch H A amounts to; the ſtar I is in ſouth latitude, the quantity whereof is meaſured by the arch I B.

From what has been ſaid, it appears that we muſt carefully diſtinguiſh the different notions of latitude, when applied to ſtars in the heaven, or places on the earth; that is, between latitude in aſtronomy, and latitude in geography; for in the heaven, or upon the celeſtial globe, it is the diſtance from the ecliptic; but upon the earth, or upon the terreſtrial globe, it is the diſtance from the equator. Indeed, ſometimes we conſider the diſtance of the heavenly bodies from the celeſtial equator; but this is called declination. See DECLINATION.

The latitude of a planet is either heliocentric, or geocentric.

Heliocentric LATITUDE *of a Planet* is the latitude it would appear in to a ſpectator placed in the ſun.

Geocentric LATITUDE *of a Planet*, is the latitude it appears in to an inhabitant of the earth. See GEOCENTRIC *Latitude*.

To illuſtrate the difference between the heliocentric and geocentric latitude of a planet, let A B (plate LXV. *fig.* 3.) be the orbit of the earth, C D the orbit of Mars, both viewed with the eye in their common ſection continued, whereby they appear ſtraight lines; let E and F be oppoſite points of the ecliptic;

ecliptic : ſuppoſe Mars to be in his ſouth limit at C; if he were at that time viewed from S, the center of the ſun, he would appear in the ſphere of the heaven at the point H; his heliocentric latitude then is F H. But let Mars in C be viewed from the earth, and he will appear in different places, according as the earth is in different parts of her orbit; for if the earth be at B, a line drawn from B through C ſhews the apparent place of Mars to be at *g*, and his geocentric latitude is then F *g*; if the earth be at A, the apparent place of Mars will be in G, and his geocentric latitude F G; if the earth be in any other part of her orbit, as at the point I or K, it is eaſy to ſee, by a line drawn from either of thoſe points through Mars at C, that he will appear in different places in the ſphere of the heaven, and would be in different geocentric latitudes.

North aſcending LATITUDE *of the Moon*, when ſhe proceeds from the aſcending node towards her northern limit or greateſt elongation.

North deſcending LATITUDE, is when the moon returns from her northern limit to the deſcending node.

South deſcending LATITUDE, when ſhe proceeds from the deſcending node to her ſouthern limit.

South aſcending LATITUDE, when ſhe returns from her ſouthern limit to her aſcending node.

And the ſame things hold good of the other planets.

LATITUDINARIAN, a perſon of moderation, with regard to religious opinions, who believes there is a latitude in the road to heaven, which may admit people of different perſuaſions.

LATTEN, a name formerly given to the plates of iron covered with tin, and now uſually called tin, of which our mugs, tea-canniſters, and the like are made.

LATTEN-BRASS, plates of milled braſs, reduced to different thickneſs, according to the uſes it is intended for.

LATUS *Rectum*, in conics, the ſame with parameter. See PARAMETER.

LATUS TRANSVERSUM *of the Hyperbola*, a right line intercepted between the vertices of the two oppoſite ſections; or that part of the common axis, which is between the vertices of the upper and lower cones.

Such is the line E D (plate LXV. *fig*. 4.) where alſo D *d* and E *e* may be the parameters or latus rectums belonging to the two oppoſite ſections D L R O and O E O R.

To this latus tranſverſum anſwers the longeſt diameter in the ellipſis, which Apollonius calls the tranſverſe axis or diameter.

LATUS PRIMARIUM, a right line belonging to a conic ſection, drawn through the vertex of the ſection of the cone, and within it, as the line E E or D D. *fig*. 4.

LAVANDULA, lavender, in botany, a ſhrubby plant, with its leaves ſet in pairs, the ſtalks ſquare when young, and round when grown woody; producing, on the tops of the branches, naked ſpikes of blue labiated flowers, of which the upper lip is erect and cloven, the lower divided into three roundiſh ſegments.

LAVANDULA. *Minor ſive ſpica*, lavender with oblong, very narrow, ſomewhat hoary, undivided leaves; a native of dry gravelly ſoils in the ſouthern parts of Europe, common in our gardens, and flowering in July.

The flowers of lavender have a fragrant ſmell, to moſt people agreeable, and a bitteriſh, warm, ſomewhat pungent taſte: the leaves are weaker, and leſs grateful. They are often employed as a perfume; and medicinally, as mild ſtimulants and corroborants, in vertigoes, palſies, tremors, and other debilities of the nervous ſyſtem, both internally and externally.

The flowers are ſometimes taken in the form of conſerve; into which they are reduced, by beating them, while freſh, with thrice their weight of double refined ſugar. Their fragrance is leſs injured by beating or bruiſing them, than moſt of the other odoriferous flowers, but is nevertheleſs conſiderably diminiſhed: the flavour of the leaves is of a much leſs deſtructible kind.

Water extracts by infuſion nearly all the virtue, both of the leaves and flowers. In diſtillation with water, the leaves yield a very ſmall portion of eſſential oil; the flowers a much larger, amounting, in their moſt perfect ſtate, when they are ready to fall off ſpontaneouſly, and the ſeeds begin to ſhew themſelves, to about one ounce from ſixty. The oil is of a bright yellowiſh colour, a very pungent taſte, and poſſeſſes, if carefully diſtilled, the fragrance of the lavender in perfection. It is given internally from one drop to five, and employed in external applications, for ſtimulating paralytic limbs, and for deſtroying cutaneous inſects. The decoction, remaining after the diſtillation of the oil, is diſagreeably bitteriſh, and ſomewhat ſaline.

Rectified ſpirit extracts the virtue of lavender more completely than water. The ſpirit elevates alſo in diſtillation a conſiderable part of the odoriferous matter of the leaves, and greateſt part of that of the flowers; leaving, in the inſpiſſated extracts, a moderate pungency and bitteriſhneſs, with very little ſmell. A ſpirit prepared by pouring a gallon of proof ſpirit on a pound and a half of the freſh gathered flowers, and drawing off five pints by the heat of a water-bath, is richly impregnated with the fragrance of the flowers. More compound ſpirits of this kind, in which other aromatics are joined to the lavender, have been diſtinguiſhed by the name of Engliſh or palſy drops. The college of London directs three pints of the ſimple ſpirit of lavender, and one pint of the ſpirit of roſemary, to be digeſted on half an ounce of cinnamon, half an ounce of nutmegs, and three drams of red ſaunders, as a colouring ingredient: the college of Edinburgh orders a gallon and a half of rectified ſpirit of wine to be drawn over from three pounds of freſh lavender flowers, one pound of thoſe of roſemary, and three ounces of lemon-peel; and afterwards three ounces of cinnamon, one of cloves, one of cubebs, and two of red ſaunders, to be macerated for three days in the diſtilled ſpirit. Theſe preparations are taken internally, on ſugar, or in any convenient vehicle, from ten to an hundred drops, and uſed externally in embrocations, &c.

Lavendula *Major ſive vulgaris*, broad lavender, with longer, wider, and hoarier leaves, and much larger ſpikes, though ſmaller flowers; common in the ſouthern parts of Europe, but rare among us. The name ſpike is applied by foreign writers to this ſpecies, by ſome of ours to the firſt.

The broad-leaved lavender is ſtronger both in ſmell and taſte than the narrow, and yields in diſtillation almoſt thrice as much eſſential oil; but the flavour both of the oil and of the plant itſelf, is much leſs grateful: the oil is likewiſe of a much darker colour, inclining to green. Watery and ſpirituous extracts, made from the two ſorts of lavender, are very nearly alike; the difference ſeeming to reſide only in the volatile parts.

LAVATERA, in botany, a genus of plants, whoſe flower-cup conſiſts of a double perianthium; the corolla compoſed of five plane heart-ſhaped petals, coaleſcing at their baſe; the filaments are numerous, joining in a column below, and topped with reniform antheræ: the fruit is a verticillated depreſſed arilla, jointed round a columnar receptacle: the ſeeds are ſolitary and kidney-ſhaped.

LAVATORY, or Lavoredo, an appellation given to certain places in Chili and Peru, where gold is ſeparated from the earth by means of waſhing.

LAUDANUM, a preparation of opium. See the article Opium.

LAVENDER, the ſame with lavendula. See Lavendula.

Lavender-Cotton, in botany. See the article Santolina.

LAVER, a ſacred utenſil in the temple of Jeruſalem, conſiſting of a baſon, whence they drew water by cocks.

LAUNCH, among ſailors, a ſort of boat uſed by the French, Italian, and Spaniſh ſhips; and is peculiar to thoſe which are employed in the Mediterranean trade, being better fitted for the ports of that ſea than a long boat, than which it is generally much longer, and more flat-bottomed, and alſo ſharper before. See Boat.

LAUNCHING *a Ship*, or *Boat*, puſhing them into the water from an aſcent.

When the ſhips of the ancients, particularly thoſe of Greece, were launched, they were ornamented with garlands and flowers; the mariners alſo adorned with crowns, who ſhouted with loud acclamations and other expreſſions of mirth and joy; and being purified by a prieſt, with a lighted torch, and egg and brimſtone, or after ſome other manner, were conſecrated to the god whoſe image they bore.

In the launching of ſhips now-a-days, the ſame or ſimilar expreſſions of joy and feaſting are uſed, colours are diſplayed, and ſometimes muſic performed.

The greateſt ſhip ever launched in England was the Britannia, of 100 guns, at Portſmouth; ſuch very large ſhips being uſually built in dry docks, and afterwards floated out by throwing open the floodgates, and ſuffering the water to enter, when they are finiſhed.

LAUNDER, among miners, a place where they waſh the powdered ore.

LAUNIARD, a rope paſſing alternately through two dead-eyes, to draw them together. See the article Dead Eye.

In every dead-eye there are three holes, and two of theſe dead-eyes being faſtened in two ropes, oppoſite to each other, and the launiard paſſing alternately through the firſt hole in the upper, then the firſt hole in the lower, then the ſecond hole in the upper, proceeds till the whole purchaſe is compleated: after which, the launiard, being well greaſed, is drawn extremely tight through all its parts, and draws the rope tight to which the dead-eyes are faſtened: thus the ſhrouds of the maſts are drawn tight by fixing a dead-eye in the lower end of each, with another directly underneath it, which is bolted to the ſhip's ſide by a ſhort chain; the launiard paſſing through theſe, is drawn tight by mechanical powers, and conſequently draws tight the ſhroud to which it is connected. See Shroud.

Launiard is alſo a ſmall cord or line by which any thing is held faſt, and can be occaſionally looſened, as the launiard of the buoy, the launiard of a port, &c.

LAURA, in church hiſtory, a name given to a collection of little cells, at ſome diſtance from each other, in which the hermits, in ancient times, lived together in a wilderneſs.

Theſe hermits did not live in community, but each monk provided for himſelf in his diſtinct cell. The moſt celebrated lauras mentioned in eccleſiaſtical hiſtory, were in Paleſtine; as the laura of St. Euthymius, at four or five leagues diſtance from Jeruſalem; the laura of St. Saba, near the brook Cedron; the laura of the Towers, near the river Jordon, &c.

LAUREATION, in the univerſities of Scotland, ſignifies the act of taking the degree of maſter of arts, which the ſtudents are permitted to do after four years ſtudy.

LAUREL, in botany, a well known ever-green; it delights in ſhade, and is a great embelliſhment to the parts of a wilderneſs or large ſhrubberies; it is a tree that loves liberty, and therefore very improper for a headed plant: when planted as a hedge it is very beautiful, when properly pruned with a knife, and not with its great enemy the ſheers. It is propagated from berries, cuttings, or layers. Its cover is delightful to all kind of game, as hares, pheaſants, woodcocks, &c. and will thrive in any land that is not over hot. For its generical characters, ſee the article PADUS, of which it is a ſpecies.

LAURENCE, or *Canons regular of St.* LAURENCE, a religious congregation in France, ſaid to have been founded by St. Benedict.

LAURUS, the bay-tree. See the article BAY.

LAURUSTINUS, in botany, a well known flowering ſhrub, much admired for its early blowing in the ſpring: it is propagated by laying down the young branches in autumn, when in a year's time they will be fit to be taken off and planted; the ſeaſon for tranſplanting them is in autumn. For the generical characters of the lauruſtinus, ſee the article VIBURNUM, of which it is held a ſpecies.

LAW denotes the command of ſome perſon or power, whoſe precept carries along with it the reaſon of obedience.

The word is derived from the Saxon *lah*, which ſignifies the ſame thing.

LAW *of Arms*, is a law which gives precepts how to proclaim a war, to attack the enemy, and to puniſh offenders in the camp.

LAWS *of Nature or Motion*, in phyſics, are axioms or general rules of motion and reſt, obſerved by all natural bodies in their actions on one another; of theſe Sir Iſaac Newton has eſtabliſhed the three following:

1. All bodies continue their ſtate of reſt or uniform motion in a right line, till they are made to change that ſtate by ſome external force impreſſed upon them.

This law is no other than the univerſal property of bodies, called paſſiveneſs or inactivity; whereby they endeavour to continue the ſtate they are in, whatever it be. Thus a top only ceaſes to run round, on account of the reſiſtance it meets with from the air, and the friction of the plane whereon it moves. And a pundulum, when left to vibrate in vacuo, where there is nothing to ſtop it but the friction ariſing from the motion of the pin on which it is ſuſpended, continues to move much longer than one in the open air.

2. The change of motion, produced in any body, is always proportionable to the force whereby it is effected; and in the ſame direction wherein that force acts.

This is an immediate conſequence of this axiom, the effect is always proportionable to its cauſe. For inſtance, if a certain force produces a certain motion, a double force will produce double the motion; a triple force, triple the motion, &c. If a body is in motion, and has a new force impreſſed on it in the direction wherein it moves, it will receive an addition to its motion, proportional to the force impreſſed; but if the force acts contrary to its motion, the body will then loſe a proportional part of its motion: again, if the force is impreſſed obliquely, it will produce a new direction in the motion of the body, more or leſs different from the former, in proportion to its quantity and direction.

3. Re-action is always contrary and equal to action; or the actions of two bodies upon each other are equal, and in contrary directions.

Thus, ſuppoſe a ſtone or other load to be drawn by a horſe; the load re-acts upon the horſe, as much as the horſe acts upon the load; for the harneſs, which is ſtretched equally between them both ways, draws the horſe towards the ſtone, as much as it does the ſtone towards the horſe; and the progreſſive motion of the horſe is as much retarded by the load, as the motion of the load is promoted by the endeavours of the horſe. This will be better explained from the following inſtance; let a perſon ſitting in a boat draw another boat equally heavy towards him, they will both move towards each other with equal velocities: let the boat he ſits in be the lighteſt, and it will move the faſteſt; becauſe the action being equal on both ſides, the ſame quantity of motion will be given to each boat, that is, the leſſer will have the greater velocity.

We have a farther confirmation of this from attraction. Suppoſing two bodies attracting one another, but prevented from coming cloſe together by ſome other body placed between them; if their reſpective actions, by which they tend towards each other, were not equal on both ſides, then would the intermediate body be preſſed more one way than the other, and ſo all three would begin to move by themſelves the ſame way; but that three bodies ſhould be put in motion after this manner, when no external force acts upon them, is contrary to experience; conſequently, whatever different degrees of force any two bodies may be capable of exerting, their mutual actions on each other are always equal. This may be tried with a load-ſtone and iron; which being put into proper veſſels, contiguous to one another, and made to float on the ſurface of water, will be an exact counterbalance to each other, and remain at reſt, whatever be the attractive power of the loadſtone, or the proportion of their reſpective magnitudes.

Theſe laws receive an abundant additional proof from hence, viz. that all the concluſions that are drawn from them in relation to the phænomena of bodies, how complicated ſoever their motions be, are always found to agree perfectly with obſervation. The truth of which ſufficiently appears in all parts of the Newtonion philoſophy.

LAWN, a large plain in a park, or adjoining to ſome grand ſeat. The moſt convenient ſituation is on the ſouth or ſouth-eaſt ſide of a houſe. If the lawn be a ſquare, three avenues may break out from three of the angles, and meet in the fourth angle oppoſite to the houſe: it may be bounded with walks or a ſingle row of lime trees ſet at a good diſtance from one another. A circle is a good figure for a lawn, but muſt break off before it comes againſt the front. A triangle is a very proper figure, but ſhould be obtuſe or right angled next the front.

Many perſons have preferred the lime-tree for this purpoſe, on account of their regular growth : but as the leaves of this tree often change their colour, and begin to fall very ſoon in the autumn, occaſioning a great litter in the garden; and from the end of July the trees make but an indifferent appearance ; ſo they are not to be eſteemed for theſe plantations.

The elm, oak, beech, and cheſnut, among the deciduous trees, are to be preferred to all others, as they keep their leaves late in autumn : and theſe are all of them large-growing trees ; ſo are very proper for this purpoſe.

LAXATIVE Medicines, are ſuch as regard either the belly or entire habit, and produce this effect by ſome ſoftening quality that takes away the tenſity of the fibres, and facilitates the paſſage of the contents in the internal tube.

LAY *Brothers*, among the Romaniſts, thoſe pious, but illiterate perſons, who devote themſelves, in ſome convent, to the ſervice of the religious.

Lay *Land*, or Ley *Land*, in huſbandry, fallow-ground, or ſuch as lies untilled. See Leys.

Lay *Man*, one who follows a ſecular employment, or has not entered into holy orders.

Lay *Man*, among painters, a ſmall ſtatue, either of wax or wood, whoſe joints are ſo formed, that it may be put into any attitude or poſture. Its principal uſe is for adjuſting the drapery in cloathing of figures.

LAYERS, in gardening, are tender twigs or ſhoots of trees, part of which are laid or buried in the ground, till having ſtruck root, they are afterward ſeparated from the parent tree, and become diſtinct plants. Many plants and trees are propagated by laying, when all other methods fail ; and particularly thoſe exotic trees which do not produce ſeeds with us. The operation is performed by ſlitting the branches from the middle of a joint upwards a little way (as is practiſed with carnations) and laying them about half a foot in the ground ; and if they are not pliable, they ſhould be pegged down with a hook ; with ſome plants a twiſt at the place intended to ſtrike root will ſuffice, or by tyeing a piece of wire round the part, and making punctures with an awl juſt above the place of bandage.

If the branches intended to be layed are not within reach of the ground, then it will be neceſſary to make uſe of tubs or pots filled with proper mould, and placed on truſſels, poſts, or ſome ſuch conveniencies, to receive the branches. The ſeaſon for laying down deciduous hardy trees is in October, but for ſuch as are tender, in March, and for evergreens, June or Auguſt are good ſeaſons. Though layers may be laid down at any time, the before-mentioned ſeaſons are moſt proper for the reaſons following; becauſe they have the whole winter and ſummer to prepare and draw root ; for at theſe times of the year the ſun has ſufficient power on the ſap of the tree to feed the leaf and bud, but has not power ſufficient to make a ſhoot ; and if that ſmall quantity of ſap that ariſes be hindered, as it will by ſome of the preceding ways of laying, the leaves and buds will gently crave of the layer, and by that means will prepare the layer to take root or put forth roots a little to maintain itſelf, finding it cannot have a proper ſupply from the mother plant. The harder the wood of a tree is, the young ſhoots will take root the beſt ; but if the wood is ſoft, the older branches will more readily root, and conſequently ſooner make a tree.

LAZARETTO, or Lazar House, a public hoſpital for the reception of the ſick poor ; and in ſome countries it is a detached edifice for perſons coming from places ſuſpected of the plague to perform quarantine in.

LAZARUS, or Lazaro, a military order inſtituted at Jeruſalem by the Chriſtians of the Weſt, when maſters of the Holy Land, who received pilgrims under their care, and guarded them on the roads from the inſults of the Mahometans.

This order was inſtituted in the year 1119, and confirmed by a bull of pope Alexander IV. in 1255, who gave it the rule of St. Auguſtine.

LAZULA, or Lapis Lazuli, a ſort of ſtone, from whence the celebrated colour called ultramarine is made.

This is one of the ores of copper, the baſis of which is a debaſed cryſtalline matter, coloured with an elegant and beautiful blue. It is a very hard compact ſtone, inſomuch as to come into the rank of thoſe that take a high poliſh, and are not liable to be ſcratched by accidents ; and therefore is worked in a number of different toys. It is found in detached lumps uſually of the ſize of a man's fiſt, often ſmaller, and ſometimes of four or five pounds weight: it is never covered with any coat or cruſt, but reſembles thoſe ſtones which have been waſhed off from whole ſtrata, and ſmoothed or rounded by accidents afterwards. It is of a naturally ſmooth and gloſſy ſurface ; and its general colour is the colour already mentioned ; but this is variegated in a very beautiful manner with ſpots or clouds of white, and with veins of a fine ſhining gold colour. It has theſe variegations, in different degrees, in ſeveral maſſes, and in general moſt to be valued, as it has leaſt of them; for though very beautiful to the eye, they are foreign to all the uſes they are put to, except when it is cut as a gem. The white clouds or veins, for this matter is ſometimes, though more rarely diſpoſed of in the laſt form, are uſually of a dead and opake hue; but ſometimes they are bright and pellucid as cryſtal; this laſt ſtate of them adds greatly to the beauty of the ſtone: the yellow ones are always bright and gloſſy; they have been ſuppoſed by many to be veins of gold, and the ſtone has been thence called a gold ore; but they are in reality only marcaſite. Sometimes that gold-like matter is not diſpoſed in veins, but in ſpots and ſtars, and in this caſe the ſtone is the ſapphire of the ancients; for they knew the gem we call the ſapphire by a very different name, calling it the ſky-blue beryl; and deſcribing what they meant by the word ſapphire to be a ſtone, opake, of a fine blue, and variegated with ſpots of a gold colour in form of ſtars. All the variations of this ſtone are ſubject, beſides, to other accidental foulneſſes, and are ſometimes debaſed to the ſtate of a mere common blue copper-colour.

LEAD, *Saturn*, in natural hiſtory, a pale or livid white metal, ſoon loſing its brightneſs in the air, and contracting a blackiſh or greyiſh aſh-colour; very ſoft and flexible; unelaſtic, and unſonorous; the heavieſt of all metallic bodies but gold, quickſilver, and platina: it is upwards of eleven times heavier than an equal bulk of water.

It melts in a very ſmall degree of fire, long before it grows red-hot: in a ſtrong red heat it emits viſible fumes. It loſes of its malleability in proportion as it is heated: by nimble agitation, when it is juſt ready to melt, or when returning from a fluid to a conſiſtent ſtate, it may be divided into ſmall grains, or powder. Granulated lead is commonly prepared, by pouring the melted metal into a wooden box rubbed on the inſide with chalk, and ſtrongly ſhaking it till it ſets or becomes ſolid; when large quantities are prepared, a wooden trough is made uſe of. It is formed into round granules or ſhot, by pouring the melted lead into cold water, through a perforated plate; a little orpiment being added to the metal in fuſion; this improves its hardneſs, and makes it run more regularly into globules without drawing a tail.

Lead, when juſt become fluid, looks bright like quickſilver but preſently contracts on the ſurface a variouſly coloured powdery pelicle. Some have ſuppoſed that this was an heterogenous ſubſtance; and that the lead by its ſeparation, became purer. But after this imaginary purification, it will ſtill, upon continuing the fire, exhibit a pelicle as at firſt: if this be taken off, or the metal ſtirred, ſo as to expoſe a freſh ſurface to the air, a new one will ariſe, till by degrees the whole quantity is changed into a duſky powder or calx, called plumbum uſtum. The injection of a little fat, charcoal powder, or other inflammable matters, prevents this change, and readily revives the calx into lead again, notwithſtanding Boerhaave's aſſertion that the calx of lead is very hard to reduce.

Calx of lead, expoſed to the fire in a furnace ſo contrived as that the flame may play upon its ſurface, becomes white, yellow, and at length of a bright red colour; hence the yellow lead or maſticot, and the red lead or minium of the painters. See the articles MASTICOT and MINIUM.

If lead be urged with a bright red heat, it changes by degrees into a yellow, flaſhy ſcoria, called litharge, of a paler or deeper colour, according to the degree of fire it has undergone. See LITHARGE.

All the calces and ſcoriæ of lead vitrify more eaſily than thoſe of any other metal: expoſed to a moderately ſtrong fire, they quickly run into a tranſparent yellow glaſs. This glaſs, in fuſion, powerfully diſſolves and vitrifies the more refractory metallic calces and earths; and unleſs ſaturated with theſe kinds of additions, corrodes and ſinks through the common crucible.

If gold or ſilver be mixt with lead, and expoſed to the fire, the lead ſcorifies, as it would by itſelf, and ariſes to the ſurface, ſo as to be raked off in the form of glaſs or litharge; at the ſame time carrying with it any imperfect metal that the gold or ſilver had been mixed with, but leaving thoſe perfect metals themſelves unhurt. Hence gold and ſilver are purified by means of lead from admixtures of the baſer metals; and hence lead is called by the chemiſts, *balneum ſolis & lunæ*, *lavacrum regis & reginæ*, *ſapa metallorum*, &c. The litharge met with in the ſhops is produced in thoſe works where gold and ſilver are thus purified; and contains the heterogenous metals which the gold or ſilver had been mixt with.

Lead expoſed for ſometime to the ſteem of vinegar or other vegetable acids, is gradually corroded into a white calx, which is the ceruſs or white lead of the ſhops. See CERUSS.

Lead is employed for various mechanic uſes; as in thin ſheets for covering buildings, for pipes, pumps, ciſterns, ſtatues, ſhot, bullets, windows, for ſecuring iron bars in hard ſtones, for ſundry kinds of large veſſels for evaporation, and many other mechanic purpoſes. It has been obſerved that plants do not thrive ſo well in leaden as in earthen and wooded veſſels. Its principal uſe in the chemical arts are for promoting the vitrification of earthy and ſtony matters, in the making of glaſs, or in the ſmelting of ores, or in the glazing of earthen veſſels; for the refining of gold and ſilver; for the eliquation of ſilver from copper; for forming with oil the baſis of varniſhes and paints.

The effects of lead on the human body are dangerous: thoſe who are expoſed to its vapours in the fire, and even thoſe who grind its calces, minium, ceruſs, and litharge, for the painters, are ſubject to violent gripes and conſtipations of the bowels, contractions of the limbs, and other diſorders. Much more hurtful is the internal uſe of lead corroded or diſſolved by acids, as ceruſs, ſaccharum ſaturni, the ſolution in vinegar called acetum lithargyrii, or the tincture drawn from the ſaccharum with ſpirit of wine, commonly called tinctura antipthiſica. The ſaturnine preparations are applied externally with ſafety, as coolers, repellents, and deſicatives: its calces, diſſolved in oils, form the baſis of moſt of the officinal plaſters.

Culinary veſſels, lined with a mixture of tin and lead, which is the uſual tinning, are apt to communicate to acid foods pernicious qualities, and require to be uſed with great precaution. In Holland, and perhaps in other places, it has been cuſtomary to correct the more offenſive expreſſed oils, as that of rape-ſeed, ſo as to ſubſtitute them to oil of olive or oil of almonds, by impregnating them with lead: this dangerous abuſe may be diſcovered by mixing a little of the ſuſpected oil with a ſolution of orpiment made in lime water; on ſhaking them together, and ſuffering them to ſtand ſome time, the oil, if it has any ſaturnine taint will appear of an orange-red colour; if pure, of a pale yellowiſh. The ſame abuſe has been extended alſo to acid wines, which diſſolve ſo much lead as to acquire a ſweet taſte, and to become ſlow poiſons. The lead is readily diſcovered in theſe likewiſe, by the ſame ſulphureous ſolution, which changes the colour of wines impregnated with this metal to a browniſh red or blackiſh; lead, whether diſſolved, or in its metallic form, being conſtantly ſtained by ſulphureous liquors or vapours.

Lead is ſometimes found in the earth native, or in its metallic form, though very rarely pure. Its common ores are nearly of the colour of lead itſelf, and appear compoſed of cubes or parallelopipeds, ſometimes large and regular, ſometimes irregular and ſmall. There are lead ores alſo of a white, greyiſh, or greeniſh colour, and priſmatic figure; but theſe are rarely met with. The ores of ſilver, copper, and other metals, except tin and iron, have often a lead ore intermixed. The lead is extracted by fuſion in contact with the fuel; the furnace being ſufficiently heated with wood or charcoal, the powdered ore is thrown in by degrees, and freſh fuel and ore occaſionally ſupplied: the lead, revived by the inflammable matter of the coals, runs down into a baſon at the bottom of the furnace; from whence it is laded out and caſt into iron moulds, into large maſſes, called pigs of lead. All the common lead ores contain ſome ſilver; the ſteelgrained, and ſuch as are compoſed of ſmall cubes, have generally more ſilver than the compact and large diced ſorts: the white and green ſcarcely hold any. The ſilver is extracted, when its quantity is conſiderable enough to bear the expence of extracting it, by ſcorifying the lead upon a teſt; the whole being kept in fuſion on a hearth made of bone-aſh, or other like materials, the lead partly vitrifies and ſinks into the hearth, and partly turns to litharge, which floats on the ſurface, and is raked or blown by bellows to one ſide; the ſilver at length remaining by itſelf. Lead almoſt always contains ſome portion of copper; and hence the ſilver obtained in this operation is ſcarcely ever free from ſome admixture of that metal.

LEADWORT, in botany. See the article PLUMBAGO.

LEAF, *Folium*, a very eſſential and ornamental part of plants, whoſe chief office is to ſubtiliſe and give more ſpirit to the abundance of nouriſhing ſap, and to convey it to the buds of the future ſhoots, which are always formed either at the baſe of the leaf, or its footſtalk.

Leaves are properly the moſt extreme part of a branch, extending into ſome determinate length, breadth, and figure, and are furniſhed with veins and nerves.

Botaniſts conſider the leaves with regard to their ſtructure, ſurface, ſhape, conſiſtence, edges, ſituation, and ſize: with regard to their ſtructure, they are either ſingle, as thoſe of the apple, pear, and plumb tree, or compound, as thoſe of the ſtrawberry, parſley, &c. a ſingle leaf is one which is either immediately joined to the branch or connected with it by a footſtalk; a leaf is ſaid to be compound, when there are more than one upon a petiole or footſtalk: with reſpect to their ſurface, they are either flat, as the origany, or in bunches, as the houſeleek: with regard to their ſhape, they are either lanceolated, cordated, acuminated, haſtated, &c. (ſee LANCEOLATED, &c.) and are either thin and fine, as thoſe of the hypericum; or thick and groſs, as thoſe of purſlane; or fleſhy, as thoſe of ſeveral kinds of aloes; or woolly; as thoſe of marſh-mallows: with regard to their edges, leaves are cut ſlightly, as in ſome ſpecies of geums, or deep, as in ſome of the centaurys: with reſpect to their ſituation, they are either ranged alternately, as the alaternus; or oppoſite to each other, as the phillyrea, mint, baum, &c. with regard to their ſize, they are either very large, as thoſe of the muſa; or moderate, as thoſe of the fig and vine; or ſmall, as thoſe of the elm or apple-tree; or very ſmall, as thoſe of the heath, phylica, &c.

Many ſorts of plants, whoſe roots iſſue forth from the ſmall end of the ſeed, put out two ſmall leaves that are very unlike thoſe which the plant afterwards produceth; for as ſoon as the root has taken hold of the ground, between theſe falſe leaves (commonly called the ſeed-leaves) there comes forth a ſhoot which produces leaves like thoſe of the mother plant;

plant: of this manner of growth there is an infinite number of plants.

Naturaliſts generally aſcribe a four-fold uſe to leaves.

1. Chiefly that they do, in the ſpring time, receive the crude humours into themſelves, divide them very minutely, and move them ſtrongly in the utricles, and, perhaps, draw in from the air, what is neceſſary, though unknown to us, and carry back great plenty of elaborated juice to the plant.

2. That there may be a tranſpiration of what is unprofitable, anſwering to the diſcharge made by ſweat; for ſometimes theſe excretory veſſels of the leaves, are ſo overcharged by the great plenty of diſtending humour, or juice, that they burſt in the middle, and let go the more ſubtile parts; nor is it ſeldom that, in a hot ſeaſon, great plenty of juices are this way diſcharged and imbibed: thus, manna is found to exude, or ſweat forth, from the leaves of certain trees, if a cold night ſhould follow a hot day; and the ſame thing frequently happens in divers other plants and trees, as we learn from bees flying to the lime-tree that they may gather that gummous ſubſtance from the leaves, and it is from the ſurface of the leaves, as well as from the flowers, thoſe animals collect their honey; but if the heat ſhould be leſs, all the ſuperfluous humours, except thoſe which, perhaps, are tranſmitted by inſenſible tranſpiration through the arterial veſſels, exhaling naturally, are ſeen to return into the trunk.

3. That the bibulous veſſels dried by the diurnal heat (and for this reaſon may be compared to veins) may imbibe in the night time, eſpecially thoſe watery parts which, among others, lie hid in the air, under the form of a very thin due, and therefore ſupply the loſs, made by the arteries, by the new moiſture received.

4. Laſtly, The leaf ſerves chiefly for this purpoſe, that it may keep, or nouriſh, the eye, or germ, till the germ, by degrees, growing out to a greater bulk, preſſes together the veſſels of the footſtalk, whence the humour is, by little and little, ſtopped in the leaf, till it cannot any more return to the footſtalk, which, by the ceaſing of the afflux and reflux of the nutritious juice, grows putrid; whence, a conſumption being cauſed, the leaf dies and falls off, which is the chief cauſe of the falling of the leaves in autumn.

Some have made obſervation, that all evergreens have their wood cloſe and compact between their annular circles, and that their holding their leaves all the winter, proceeds from the nature of their ſap, which is of a clammy and turpentine nature; and that this ſap is eaſily condenſed by cold, and requires a conſiderable ſhare of heat to make it thin and put it in motion; thus, a little cold condenſes pitch or turpentine, but it muſt be a froſt that ſtays the motion of the water; whence it happens, that thoſe trees which hold their leaves, will grow much better under the droppings of other great trees, than ſuch as ſhed their leaves; becauſe their turpentine ſap ſhoots off the drops, and prevents their entering the veſſels in too great quantities.

Dr. Hales ſays (in his Treatiſe on Vegetation) it is plain, from many experiments and obſervations which he mentions, that leaves are very ſerviceable in the work of vegetation, by being inſtrumental in bringing nouriſhment from the lower parts within the reach of the attraction of the growing fruit, which, like young animals, is furniſhed with proper inſtruments to ſuck it thence. But the leaves ſeem alſo deſigned for many other important ſervices, for nature admirably adapts her inſtruments ſo as to be, at the ſame time, ſerviceable to many good purpoſes. Thus the leaves, in which are many excretory ducts, ſeparate and carry off the redundant watery fluid, which, by being long detained, would turn rancid and prejudicial to the plant, leaving the more nutritive parts to coaleſce, part of which nouriſhment, we have good reaſon to think, is conveyed into vegetables through the leaves, that plentifully imbibe the dew, which contains ſalt, ſulphur, &c. for the air is full of acid and ſulphureous particles, which, when they abound much, do, by the action and re-action between them and the elaſtic air, cauſe that ſultry heat which uſually is attended with lightning and thunder; and theſe new combinations of air, ſulphur, and nitrous ſpirit, which are conſtantly forming in the air, are doubtleſs very ſerviceable in promoting vegetation, when, being imbibed by the leaves, they may not improbable be the materials out of which the more ſubtile and refined principles of vegetables are formed; for ſo fine a fluid as the air, ſeems to be a more proper medium wherein to prepare and combine the more exalted principles of vegetation, than the groſſer watery fluid of the ſap.

That there is plenty of theſe ſulphureous particles conveyed in the leaves, is evident, from the exudations that are found on their edges, of which the bees are obſerved to make their waxen cells, as well as from the duſt of the flowers; and that it abounds with ſulphur, is plain, from its burning freely: whence it appears, that the great uſe of leaves is to perform, in ſome meaſure, the ſame office, for the ſupport of vegetable life, as the lungs of animals do for the ſupport of animal life; plants, very probably, drawing through their leaves ſome part of their nouriſhment from the air.

LEAF, in architecture, the repreſentation of the leaf of the acanthus on the capital of the Corinthian and Compoſite orders. See the articles CORINTHIAN and COMPOSITE.

LEAF, in clocks and watches, an appellation given to the notches of their pinions. See the articles CLOCK and WATCH.

LEAGUE, a meaſure of length, containing more or leſs geometrical paces, according to the different uſages and cuſtoms of countries. A league at ſea, where it is chiefly uſed by us, being a land meaſure moſtly peculiar to the French and Germans, contains three thouſand geometrical paces, or three Engliſh miles.

The French league ſometimes contains the ſame meaſure, and in ſome parts of France it conſiſts of three thouſand five hundred paces: the mean or common league conſiſts of two thouſand four hundred paces: the little league of two thouſand. The Spaniſh leagues are larger than the French, ſeventeen Spaniſh leagues making a degree, or twenty French leagues, or ſixty nine and an half Engliſh ſtatute miles. The Dutch and German leagues contain each four geographical miles. The Perſian leagues are pretty near of the ſame extent with the Spaniſh; that is, they are equal to four Italian miles; which is pretty near to what Herodotus calls the length of the Perſian paraſang, which contained thirty ſtadia, eight whereof according to Strabo, make a mile.

League alſo denotes an alliance or confederacy between princes and ſtates for their mutual aid, either in attacking ſome common enemy, or in defending themſelves.

LEAK, among ſailors, a cranny or hole through which water enters into a ſhip either through her deck or ſides.

LEAKAGE, the ſtate of a veſſel that leaks, or lets water, or other liquid, ouze in or out.

Leakage, in commerce, is an allowance of 12 per cent. in the cuſtoms allowed to importers of wines for the waſte and damage it is ſuppoſed to have received in the paſſage: an allowance of two barrels in twenty-two is alſo made to the brewers of ale and beer, by the exciſe office.

LEAP, *Salto*, in muſic, is when the ſong does not proceed by conjoint degrees, as when between each note, there is an interval of a third, fourth, fifth, &c. See Degree and Conjoint.

Leap Year, the ſame with biſſextile. See Bissextile.

LEASE, in law, a demiſe or letting of lands, tenements or hereditaments unto another for life, term of years, or at will, for a rent reſerved.

Lease and Release, as uſed in our law, ſignifies a certain inſtrument, in writing, for the conveyance of a right or intereſt in lands and tenements in fee to another

LEASH, among ſportſmen, denotes three creatures of any kind; but chiefly greyhounds, foxes, bucks, and hares.

The term leaſh alſo ſignifies a line to hold in a hunting dog; and a ſmall long thong of leather, by which a falconer holds his hawk.

LEATHER, the ſkin of ſeveral kinds of beaſts, dreſſed and prepared for the uſe of the various manufactures, whoſe buſineſs is to make them up. The butcher and others who flay off their hides or ſkin, diſpoſe of them raw or ſalted to the tanner and tawer, and then to the ſhamoy, Morocco, and other kind of leather dreſſers, who prepare them according to their reſpective arts, in order to diſpoſe of them among the curriers, glovers, harneſs-makers, coach-makers, ſaddlers, breeches makers, gilt leather-makers, chair-makers, ſhoe-makers, bookbinders, and all in any way concerned in the article of leather.

The three principle aſſortments of leather are tanned or tawed, and oil and alum-leather; and it may be affirmed, with great truth, that the ſkins of our own production, and thoſe imported from our colonies, when dreſſed in this kingdom, make the beſt leather in the world, and that therefore this is an article of great importance to the trade of the nation.

Though there is no little difference between the dreſſing of ſhamoy-leather, alum-leather, Hungary leather, Morocco leather, parchment, and tanning; yet the ſkins which paſs through the hands of theſe ſeveral workmen, ought to have been for the moſt part, at leaſt waſhed clean from blood and impurities in a running water; ſet to drain, worked with the hands, or pounded with wooden peſtels in a vat; put into the pit, which is a hole lined either with wood, or with ſtone and mortar, filled with water in which quick-lime is diſſolved, in order to looſen the hair that it may be eaſily rubbed off without injuring the ſkin; drawn out, and ſet to drain on the edge of the pit; ſtretched on the leg or horſe, in order to have the hair ſcraped off with a blunt iron-knife, or wooden cylinder; the membranes on the fleſhy ſide, and the ſcabs or roughneſs on the grain-ſide, pared off with a ſharp-knife, and the ſkins rubbed with a whetſtone, to take off any particles of the lime, or any thing elſe that may occaſion hardneſs; thickened by different ſorts of powder, whereby they become greater in bulk, and ſo much lighter as gradually to riſe to the ſurface of the water; ſtretched out green or half dried, and piled one over another; or put up ſeparate after they are dried, and hung out to air upon poles, lines, or any other way: which muſt be repeatedly done in the dreſſing of ſmall ſkins. This alternate tranſition from the liquid of the air into that of water, and from water in the air, with the aſſiſtance of lime, ſalts, and oils, opens the inmoſt fibres of the ſkin ſo effectually, as greatly to facilitate the introduction of ſubſtances proper for making them pliant, without rendering them thinnner.

The alum leather dreſſer dreſſes all ſorts of white leather from the ox-hide to the lamb ſkin; for dreſſing the ſadler's leather, he uſes bran, ſea-ſalt, and alum; and for that which the glover uſes, after the common preparatives, he firſt employs bran, and then with ſalt, alum, fine flower, and yolks of eggs mixed in hot water, he makes a ſort of pap, with which the ſkins are ſmeared in a trough.

The ſhamoy leather-dreſſer ſoaks in oil, not only the ſkins of the true ſhamoy (which is a wild goat) but likewiſe thoſe of all other goats. The tanner uſes the bark of young oaks ground in a tanning-mill, in which he ſoaks the ſkins more or leſs, according to the different ſervices expected from them, their chief uſe being to remain firm and keep out water. In certain caſes, inſtead of tan, he uſes redon, which is chiefly uſed for tanning ram, ſheep-ſkins, and dreſſing Ruſſia leather. But for the different methods in which the tanner, currier, Ruſſia and Morocco leather-dreſſers, proceed, in finiſhing their ſkins, ſee the articles CURRYING, TANNING, &c.

LEAVEN, a piece of ſour dough, uſed to ferment and render light a much larger quantity of dough or paſte.

LECHEA, in botany, a genus of plants whoſe flower conſiſts of a triphyllous cup, with three oblong petals and three ſtamina: the fruit is an ovate, triquetrous, trilocular capſule, containing three egg-ſhaped ſeeds, angulated on their backs.

LECTICA, in Roman antiquity, a vehicle in which people were carried in a reclining poſture.

LECTISTERNIUM, a religious faſt or banquet of the ancient Romans. In times of public danger or calamity, or of thankſgiving for ſome happy event, the republic ordered ſolemn feaſts to be made for the gods; and this ſolemnity was called lectiſternium, becauſe on this occaſion they ſpread tables, and placed beds around them, on which their heavenly gueſts were to lie and eat.

LECTURERS, in England, are an order of preachers in pariſh churches, diſtinct from the rector or vicar. They are choſen by the veſtry, or chief inhabitants of the pariſh, and are uſually the afternoon preachers.

LEDGER, the principal book wherein merchants enter their acconnts. See BOOK-KEEPING.

LEDUM, wild roſemary, in botany, a plant which grows naturally in moiſt places in ſeveral parts of England: it riſes with a ſlender ſhrubby ſtalk, dividing into many branches, which are furniſhed with narrow leaves: the flowers come out in cluſters at the ends of the branches, each having five oval hollow petals, and ten ſtamina: the fruit is a roundiſh capſule, with five cells, which are filled with ſmall narrow pointed ſeeds.

LEE, in the ſea language, that part of the hemiſphere to which the wind bloweth, in oppoſition to the weather or windward ſide. This expreſſion however is only uſed in a ſhip, when the wind croſſes the line of her courſe at a greater or leſs angle; and hence

Under the LEE implies farther to lee-ward, or farther from that part of the horizon from which the wind bloweth, as

Under the LEE *of the Shore*, i. e. at a ſhort diſtance from that ſhore which lies to the wind-ward, or from the land where the wind blows from. This phraſe is commonly uſed to expreſs the ſituation of a ſhip or boat which may be anchored, or ſailing under the weather-ſhore, where there is always ſmoother water and leſs danger of heavy ſeas than at a great diſtance from it.

The Land appears under our LEE, i. e. at ſome diſtance from a ſhip on that ſide to which the wind bloweth, as it thwarts her way: and hence

LEE-LARCHES, the ſudden roll which a ſhip makes to lee-ward in a high ſea, when a large wave ſtrikes her, and bears her weather-ſide violently up, which depreſſes the other in proportion.

LEE-SIDE is the ſide of a ſhip which is fartheſt from the wind, as oppoſed to the weather-ſide, which is neareſt to it.

Thus, admit a ſhip to be ſailing northward with the wind at weſt, then her ſtarboard, or right ſide, is the lee-ſide, and the larboard, or left, the weather-ſide.

To LEE-WARD, towards that part of the hemiſphere which lies under the lee, or to which the wind bloweth.

LEE-WARD-SHIP, a ſhip that, going cloſe-hauled, loſes much ground, and deviates further to lee-ward from her courſe than common. See the article CLOSE-HAULED.

LEE-WAY is the angle that the rhumb-line, upon which the ſhip endeavours to ſail, makes with the rhumb upon which ſhe really ſails.

This is occaſioned by the force of the wind, or ſurge of the ſea, when ſhe lies to the windward, or is cloſe hauled; which cauſes her to fall off and glide ſide-ways from the point of the compaſs ſhe capes at. Thus, let N E S W (plate LXV. *fig*, 5.) repreſent the compaſs, and ſuppoſe a ſhip at C capes at, or endeavours to ſail upon the thumb C a, but by the force of the wind and ſurge of the ſea ſhe is obliged to fall off, and make her way good upon the rhumb C b; then the angle a C b is the lee-way: and if that angle be equal to one point, the ſhip is ſaid to make one point lee-way; or if equal to two points, the ſhip is ſaid to make two points lee-way, &c.

The quantity of this angle is very uncertain; becauſe ſome ſhips, with the ſame quantity of ſail, and with the ſame gale, will make more lee-way than others; it depending much upon the mould and trim of the ſhip, and the quantity of water that ſhe draws. However, the common allowances made for lee-way, are theſe: 1. If the ſhip be cloſe hauled, has all her ſails ſet, the water ſmooth, and a moderate gale of wind, ſhe is ſuppoſed to make little or no lee-way. 2. If it blow ſo freſh, as to cauſe the ſmall ſails to be handed, it is uſual to allow one point. 3. If it blow ſo hard, that the tops muſt be cloſe reefr, the ſhip then makes about two points lee-way. 4. If one topſail muſt be handed, it is common to allow two and three-quarter or three points lee-way. 5. When both topſails muſt be handed, they allow about four points lee-way. 6. When it blows ſo hard as to occaſion the fore courſe to be handed, the allowance is between five and a half and ſix points. 7. When both main and fore courſes muſt be handed, then ſix, or ſix and a half points muſt be allowed for her lee-way. 8. When the mizzen is handed, and the ſhip is trying a-hull, ſhe then makes her way good about one point before the beam, that is, about ſeven points lee-way.

Though theſe rules are ſuch as are generally uſed, yet as the lee-way depends much upon the mould and trim of the ſhip, we ſhall here give the method of aſcertaining it by obſervation; thus let the ſhip's wake be ſet by a compaſs in the poop, and the oppoſite rhumb is the true courſe made good by the ſhip; then the difference between this and the courſe given by the compaſs in the bittacle, is the lee-way required. If the ſhip be within ſight of land, the lee-way may be exactly found by obſerving a point of the land which continues to bear the ſame way; for the diſtance between the point of the compaſs it lies on, and the point the ſhip capes at, will be the lee-way. Thus, ſuppoſe a ſhip at C (*fig.* 6.) is lying up at N *b* W, towards A; but inſtead of keeping that courſe, ſhe is carried on the N N E line C B, and conſequently the point B continues to bear always the ſame way from the ſhip: here it is evident, that the angle A C B, or the diſtance between the N *b* W line that the ſhip capes at, and the N N E line that the ſhip really ſails upon, will be the lee-way. See the articles Compass, Course, Journal, &c.

LEECH, *Hirudo*, in zoology. See the article Hirudo.

Leech *of a Sail*, the perpendicular or upward ſloping-edges of a ſquare, oblong, or triangular ſail: in a ſquare or oblong ſail, the leeches are thoſe which are perpendicular, as oppoſed to the upper-edge, which is called the head, and to the lower, which is called the foot of the ſail. In triangular ſails, when there are only three ſides, two of them are called the fore and after-leeches, and the third, which is the lower-edge, the foot.

Leech-Line, one of the brails of the main-ſail and fore-ſail, or one of thoſe cords which draw them together in a lump, when they are to be furled or reefed. See the articles Brail and Furl.

The leech-line is ſo called from its being faſtened to the ſail in or near the middle of the leech.

Leech-Rope, the rope to which the leech of the ſail is ſewed. See the article Bolt-Rope.

LEEK, a garden plant, called by botaniſts porrum. See the article Porrum.

Leeks are commonly ſown along with onions; the onions growing up firſt are pulled up, ſo that the leeks have room to grow to their full ſize.

LEER, in glaſs-making, a furnace where the veſſels are allowed to cool by degrees. See Glass.

LEES, the more groſs and ponderous parts of liquors, which, being ſeparated by fermentation, fall to the bottom.

A ſpirit of a very agreeable flavour is obtained, by the common proceſs of diſtillation from wine lees; and as this flavour depends greatly on the eſſential oil of the lees, care ſhould be taken to bring it over with the ſpirit. In order to this, the ſolid lees muſt be ſteeped in ſix or eight times their own weight of water, and well ſtirred at times, before they are put into the ſtill. See Distillation,

LEET, *Leta*, a little court held within a manor, and called the king's court, on account that its authority to puniſh offences originally belonged to the crown, from whence it derived to inferior perſons. See Court-Leet.

LEG, *Crus*, in anatomy, includes the whole of the lower extremities, from the os innominatum to the toes, being commonly divided into thigh, leg, and foot. See the articles Thigh and Foot.

LEGACY ſignifies any thing that is particularly given or bequeated by a laſt will and teſtament. See Will and Testament.

LEGATE, a cardinal or biſhop, whom the pope ſends as his ambaſſador to ſovereign princes. See Ambassador.

There are three kinds of legates, viz. legates a latere, legates de latere, and legates by office, or legati nati: of theſe the moſt conſiderable are the legate a latere, the next are the legates de latere. See the article A Latere.

Legates by office are thoſe who have not any particular legation given them, but who by virtue of their dignity and rank in the church become legates; ſuch are the archbiſhops of Rheims and Arles; but the authority of theſe legates is much inferior to that of the legates a latere.

LEGATUS, in Roman antiquity, a military officer who commanded as deputy of the chief general.

LEGEND, an idle or ridiculous ſtory told by the Romaniſts concerning their ſaints, and other perſons, in order to ſupport the credit of their religion.

LEGER-Line, in muſic, one added to the ſtaff of five lines, when the aſcending or deſcending notes run very high or low: there are ſometimes many of theſe lines both above and below the ſtaff, to the number of four or five.

LEGGIARDO, or Leggiardemente, in muſic,

Fig. 1. Lens.

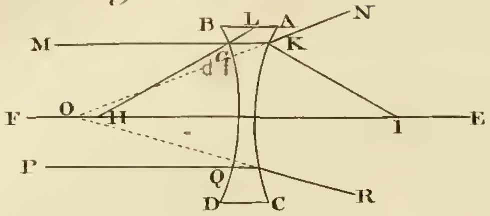


Fig. 2. Lens.

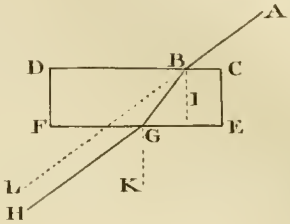
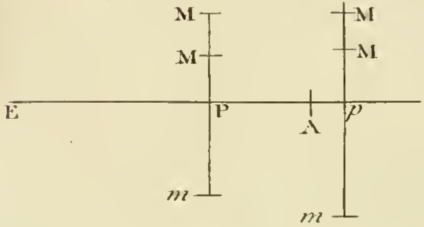


Fig. 3. Locus.



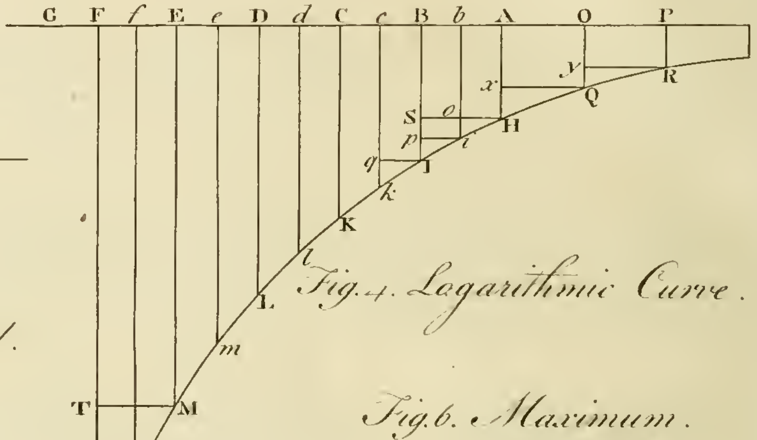


Fig. 4. Logarithmic Curve.

Fig. 5. Logarithmic Spiral.

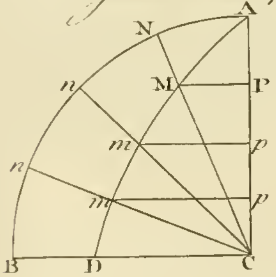


Fig. 6. Maximum.

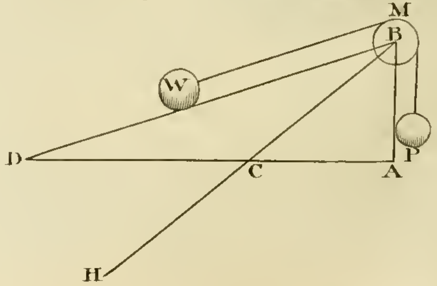


Fig. 7. Maximum.

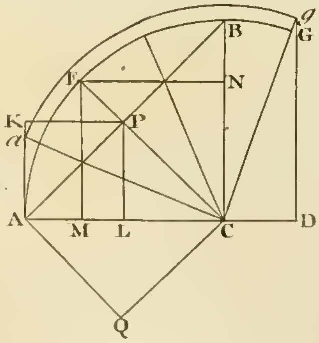
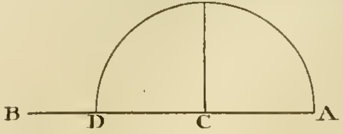


Fig. 8. Maximum.



J. Lodge sculp.

muſic, ſignifies to play or ſing in a lively, briſk, and gay manner.

LEGION, in Roman antiquity, a body of foot which conſiſted of ten cohorts.

The exact number contained in a legion, was fixed by Romulus at three thouſand; though Plutarch aſſures us, that after the reception of the Sabines into Rome, he encreaſed it to ſix thouſand. The common number afterwards, in the firſt times of the free ſtate, was four thouſand; but in the war with Hannibal it aroſe to five thouſand, and after this it is probable that it ſunk again to four thouſand, or four thouſand two hundred, which was the number in the time of Polybius.

LEGISLATOR, or Law-Giver, he who frames laws for any ſtate or kingdom.

LEGITIMATION, an act whereby illegitimate children are rendered legitimate. See the article Bastard.

LEGUME, *Legumen*, among botaniſts, denotes a pericarpium of an oblong compreſſed figure, formed of two valves, joined by a viſible ſuture both on the upper and under parts, and having the ſeeds affixed to the upper limbs of the two valves, in an alternate order.

LEGUMINOUS, an appellation given to all plants whoſe fruit is a legume.

LEMMA, in mathematics, a previous propoſition laid down, in order to clear the way for ſome following demonſtration; and is prefixed either to the theorems or problems.

Thus, to prove a pyramid one third of a priſm of the ſame baſe and height with it, as the demonſtration is difficult, this lemma may be premiſed, which is proved in progreſſion, "That the ſum of the ſeries of the ſquares of numbers in arithmetical progreſſion, beginning from 0, 1, &c. is always ſubtriple of the ſum of as many terms equal to the greateſt; or is always one third of the greateſt term multiplied by the number of terms." And, in like manner to find the inflection of any curve, this lemma is firſt premiſed, "That a tangent may be drawn to the given curve in a given point;" and ſo in phyſics, medicine, &c.

LEMNA, duck-weed, in botany, a genus of plants, producing diſtinct hermaphrodite and female flowers: neither of which have any flower petals: the ſtamina are two ſubulated filaments; and the fruit is a globoſe, unilocular capſule.

LEMON, *Limon*, in botany, a genus of trees with large ſtiff leaves like the citron, without any appendage at the bottom; the flower conſiſts of many leaves, which expand in form of a roſe: the fruit is almoſt of an oval figure, and divided into ſeveral cells, in which are lodged hard ſeeds ſurrounded by a thick fleſhy ſubſtance, which, for the moſt part, is full of an acid juice.

All ſorts are propagated by budding or inarching them either on ſtocks of lemons or citrons produced from ſeeds, but they will not readily unite on orange ſtocks; for which reaſon the citrons are preferable to either oranges or lemons for ſtocks, as they readily join with either ſort; and being of larger growth, cauſe the buds of the other ſorts to be much ſtronger than if they were on ſtocks of their own kind.

The culture of the lemon is the ſame with that of the orange-tree, with this difference only, the former being hardier than the latter, will conſequently bring their fruit to maturity with us much better than the orange will, and therefore require to have a greater ſhare of freſh air in winter; for which reaſon they ſhould always be placed near to the doors or windows of the green-houſe: and in ſome curious gardens theſe trees have been planted againſt walls, where, by covering them with glaſſes in winter, and protecting them from ſevere froſts, they have produced plenty of large fruit: as theſe trees do generally produce ſtronger ſhoots, ſo they require more water to be given them than the orange; but as to the tender ſorts, they muſt be treated with a little more care, otherwiſe their fruit will fall off in winter, and come to nothing. See Orange.

LEMONADE, a liquor prepared of water, ſugar, and lemon or citron-juice: it is very cooling and grateful.

LAMURIA, a feſtival of the ancient Romans, ſolemnized on the ninth of May, to pacify the manes of the dead, who were the lemures or phantoms that came in the night to torment the living.

LENITIVE Medicines, among phyſicians, thoſe of a mild, ſoftening, and relaxing nature, and deſtitute of all acrimony.

LENS, in dioptrics, a ſmall oblong glaſs like a lentil; it is a medium terminated on one ſide by a ſpherical ſurface, on the other by a ſurface either plain or ſpherical. And of theſe there are five ſorts. The firſt, as A (plate LXV. *fig.* 7.) is plain on one ſide, and convex on the other; the ſecond, B, convex on both ſides; the third plain on one ſide and concave on the other, as C; the fourth, D, concave on both ſides; the fifth convex on one ſide and concave on the other, as E, which is by ſome called a meniſcus.

The axis of a lens is a line paſſing perpendicularly through both its ſurfaces: thus the line F G is an axis common to all the five.

Lenſes are diſtinguiſhed into two general kinds, convex and concave: the firſt and ſecond lenſes are conſidered as convex; the third and fourth as concave: the laſt, if its convexity is greater than its concavity, is looked upon as convex; if on the contrary, it is conſidered as concave.

A lens is always ſuppoſed to conſiſt of a medium denſer than the circumambient one, unleſs where the contrary is expreſſed.

When parallel rays fall upon the ſurface of a convex lens, they are refracted towards each other in paſſing through it, and thereby collected to a focus on the other ſide.

To explain this, let us trace the progreſs of a ray, as A B (*fig.* 8.) through the convex lens C D E H, whoſe axis is I K. Let L be the center of the firſt convexity C D E, and M that of the other C H E: and let this ray A B be parallel to the axis; through B draw the line L N, which will be perpendicular to the ſurface C D E at that point. The ray A B in entering the denſer ſubſtance of the lens will be refracted towards the perpendicular, and, therefore, proceed, after it has entered the ſurface at B, in ſome direction inclined towards the axis, as B P. Through M, the center of convexity of this ſurface, and the point P, draw the line M R, which paſſing through the center will be perpendicular to the ſurface at P, and the ray now entering a rarer medium, will be refracted from the perpendicular into ſome direction at P F. In like manner and for the ſame reaſons, the parallel ray S T on the other ſide the axis, and alſo all the intermediate ones, as X Z, &c. will meet in the ſame point, unleſs the rays A B and S T enter the ſurface of the lens at too great a diſtance from the axis I F, the reaſon of which has already been fully explained. See REFRACTION.

The point F, where the parallel rays A B, S F, &c. are ſuppoſed to be collected by paſſing through the lens C E, is called the focus of parallel rays of that lens.

If the rays converge before they enter the lens, they are then collected at a point nearer to the lens than the focus of parallel rays. If they diverge before they inter the lens, they are then collected in a point beyond F; unleſs they proceed from a point on the other ſide at the ſame diſtance with the focus of parellel rays, in which caſe they are rendered parallel. If they proceed from a point nearer than that, they diverge afterwards, but in a leſs degree than before they enter the lens.

If the lens is plain on one ſide and convex on the other, the rays are refracted the ſame way, but in a leſs degree.

Had the rays A B, S T, proceeded from a radiant point on one ſide the lens, and been collected in a focus on the other; then if they ſhould be ſuppoſed to proceed from that focal point as from a radiant, and paſs through the lens the contrary way, they would be collected in that point which was the radiant in the other caſe: and the nearer the radiant point is to the lens, the farther is the focus from it on the other ſide, and vice verſa.

If the rays A B, C D, E F, &c. (*fig.* 9.) be parallel to each other, but oblique to G H, the axis of the lens I K, or if the diverging rays C B, C F, proceed as from ſome point, C, which is not ſituated in the axis of the lens, they will be collected into ſome point, as L, not directly oppoſite to the radiant C, but nearly ſo: for the ray C D, which paſſes through M, the middle of the lens, and falls upon the ſurface of it with ſome obliquity, will itſelf ſuffer a refraction at D and N; but then it will be refracted the contrary way in one place to what it is in the other; and theſe refractions will be equal in degree, if the lens has an equal convexity on each ſide, as we may eaſily perceive, if we imagine N D to be a ray paſſing out of the lens both at N and D; for it is evident that the line N D has an equal inclination to each ſurface at both its extremities. Upon which account the difference between the ſituation of the point L and one directly oppoſite to C is ſo ſmall, that it is generally neglected; and the focus is ſuppoſed to be in that line, which a ray, that would paſs through the middle point of the lens, were it to ſuffer no refraction, would proceed in.

All which is ſufficiently clear, from what is ſaid under the article REFRACTION.

When parallel rays fall upon a concave lens, they are refracted from each other in paſſing through it, and thereby made to diverge, proceeding as from an imaginary focus on the firſt ſide of the lens.

In order to comprehend this, let A B C D (plate LXVI. *fig.* 1.) repreſent a concave lens, E F its axis, G H the radius of the firſt concavity, I K that of the ſecond; produce G H to L, and let M G be a ray of light entering the lens at the point G. This ray, being refracted towards the perpendicular G L, will paſs on to ſome point, as K, in the other ſurface, more diſtant from the axis than G, and being there refracted from the perpendicular I K, will be diverted farther ſtill from the axis, and proceed in the direction K N as from ſome point at O on the firſt ſide of the lens. In like manner other rays, as P Q, parallel to the former, will proceed after refraction at both ſurfaces as from the ſame point O; which upon that account will be the imaginary focus of parallel rays of this lens.

If the rays diverge before they enter the lens, their imaginary focus is then nearer the lens than that of the parallel rays. If they converge before they enter the lens, proceeding towards ſome diſtant point in the axis at E, they are then rendered leſs converging; if they converge to a point at the ſame diſtance from the lens with the focus of parallel rays, they then go out parallel; if to a point at leſs diſtance, they remain converging, but in a leſs degree than before they entered the lens.

When the rays enter the lens diverging, the nearer their radiant point is to it, the nearer alſo is their imaginary focus after refraction, and vice verſa.

If the lens is plain on one ſide and concave on the other, the rays ſuffer a like refraction in each caſe, but in a leſs degree.

The truth of what has been ſaid, concerning the paſſage of rays through a concave lens, is eaſily deduced from the laws of refraction.

But the method of determining the exact focal diſtance of lenſes, is to be had from the propoſitions laid down and demonſtrated in the article REFRACTION, which ſee.

Thus the progreſs of the rays, after their refraction at the firſt ſurface where they enter a lens, is had by one of thoſe which determines the focal diſtance of rays entering a denſer medium of ſuch form: and their progreſs, after their refraction at the other ſurface where they go out, is had by computing what progreſs rays, moving in the direction they are found to have after their entrance at the firſt ſurface, will acquire by being refracted at the other; which is to be effected by one who determines the focal diſtance of rays paſſing out of a denſer medium of like form with that of the lens.

When a ray paſſes through a medium, terminated by two plain and parallel ſurfaces, it is refracted one way in going out of the ſecond, as much as it was the other in entering the firſt; and, therefore, proceeds afterwards, not in the ſame direction, but in one which is parallel to that which it had before.

Thus, if the ray A B (*fig.* 2.) enters the denſer medium C D E F terminated by the parallel ſurfaces C D and E F, it is refracted at B towards the perpendicular B I, proceeding to a point at G, where it is as much refracted from the perpendicular G K in going out, and proceeds in the direction G H, not the ſame, but parallel to the former A B L.

LENT, a ſolemn time of faſting in the Chriſtian church, obſerved as a time of humiliation before Eaſter, the great feſtival of our Saviour's reſurrection.

Thoſe of the Romiſh church, and ſome of the proteſtant communion, maintain, that it was always a faſt of forty days, and as ſuch, of apoſtolical inſtitution. Others think, it was only of eccleſiaſtical inſtitution, and that it was variouſly obſerved in different churches, and grew by degrees from a faſt of forty hours, to a faſt of forty days. This is the ſentiment of Morton, biſhop Taylor, du Moulin, Daillé, and others.

The Chriſtians of the Greek church obſerve four Lents; the firſt commences on the fifteenth of November, or forty days before Chriſtmas; the ſecond is the ſame with our Lent; the third begins the week after Whitſuntide, and continues till the feſtival of St. Peter and St. Paul; and the fourth commences on the firſt of Auguſt, and laſts no longer than till the fifteenth. Theſe Lents are obſerved with great ſtrictneſs and auſterity; but on Saturdays and Sundays they indulge themſelves in drinking wine and uſing oil, which are prohibited on other days.

LENTA FEBRIS, the ſlow fever. See the article FEVER.

LENTIGO, FRECKLES, in medicine. See the article FRECKLES.

LENTISCUS, the lentiſk or maſtich-tree, in botany, a genus of trees, very nearly allied to the terebinthus, or turpentine-tree, in its characters, but differing in that the leaves are pinnated; but there is no ſingle leaf to terminate the end of each compound one. See the article MASTICH.

LEO, the lion, in zoology. See LION.

LEO, in aſtronomy, one of the twelve ſigns of the zodiac, the fifth in order, containing, according to Ptolemy, thirty-two ſtars; according to Tycho, thirty-ſeven; and in Mr. Flamſtead's, ninety-four. The latitudes and longitudes of which are as follow. See plate LXVII.

Names and ſituations of the ſtars.	Sign ♌	Longitude. ° ′ ″	Latitude. ° ′ ″		Magnit.
That in the noſtrils		11.47.49	10.23.51	N	4
In the foremoſt toe of the ſouthern fore-foot		18. 3.18	5.35.27	S	5
		18.20. 7	6.24.22	S	6
In the aperture of the mouth		14.22.34	7.51.27	N	4
In the third toe of the northern fore-foot 5.		18.10. 5	3.11.22	S	4
Northern and following in the claw		18.40.22	4 41.12	S	6
		18. 4.47	0. 1.52	N	6
		15.11.25	9.55.48	N	6
		20.50.24	6.59.47	S	5
10.		15.14.35	10.41. 9	N	78
		15.35.35	11.23.26	N	7
Following in ſouthern fore-foot		20.46.29	3.46 50	S	34
		14.34 53	15.21. 3	N	6
In the preceding knee		20. 0.25	0.19. 3	N	6
Southern of three in the head 15.		17.12.37	9.41. 4	N	3

LEO

LEO

Names and ſituations of the ſtars.	Sign	Longitude.	Latitude.		Magnit.
		° ′ ″	° ′ ″		
		21.20.49	1.33.23	S	6
		21.39.41	1.42.11	S	7
		18.57.53	7.32.58	N	6
		22.21.23	1. 9.33	S	7
Middle one of the head		18.17.56	10.45. 1	N	6
20.					
North, in the head		17.56.47	12.19.29	N	34
		24.39.53	3.25.39	S	7
		22.53.26	2.37.58	N	7
Juſt before the heart		23.51.13	0. 1.25	N	45
		25.14.33	3.51.45	S	79
25.					
In the following knee		25.39.25	3.56.18	S	4
South. of three in the neck		34.24.45	4.50.20	N	34
In the breaſt below the heart		26.55.37	1.26.15	S	5
The lion's heart, called Regulus		26.21.41	0.26.38	N	1
		25.34.21	4. 8.45	N	7
30.					
		26.36.31	2. 1.10	N	6
		24. 1.33	11.55.37	N	6
North. in the neck		24. 4. 2	11.50.13	N	3
		27.36.22	2.48. 7	N	6
		24.21.13	11.37.13	N	6
35.					
		26.12 46	8.26.51	N	6
Middle and ſubſeq. in the neck		26. 5.26	8.47.27	N	2
		28.19.44	4.24.54	N	6
	♍	1.37.31	3.20.14	S	6
		1.21. 0	1. 2.27	S	56
40.					
Preceding and leſſer		1.33. 6	0. 5. 8	N	6
Preceding of three in the belly		0.58.19	4.33.27	N	6
In the oxilla		2.54. 1	0. 7.48	N	4
		4.14 26	1.52.27	S	6
		3.39.46	0.16.10	S	7
45.					
Informis 40th of Urſa Maj. Tych.	♌	25.11.16	21.37. 1	N	3
	♍	1.43.51	7. 0.25	N	67
Foremoſt of two over the back	♌	28.39.35	16.49. 4	N	65
		29.59.36	13.56.46	N	5
In the middle of the back	♍	2.20.35	10.14.52	N	6
50.					
North. of three in the belly		4. 9 42	5.54.48	N	6
South. and ſubſeq. in the belly		6.11.40	2.47.40	N	6
Subſeq. over the back		2. 0 42	16.28.40	N	45
		11.24.53	5.39.57	S	65
		9.23 56	0.35.42	S	67
55.					
		11.38.58	5.54. 3	S	7
South. of three under the belly		11.25.55	2.31.51	S	5
Middle under the belly		10.30.54	0.13.16	S	5
Preceding in the loins		5.21.29	12.53.37	N	5
		14. 4. 1	8. 3. 1	S	5
60.					
		14 32.32	5.34.35	S	6
North. of three under the belly	♍	11. 2.30	1.20.21	N	45

Names and ſituations of the ſtars.	Sign	Longitude. ° ′ ″	Latitude. ° ′ ″		Mag.
		5.13.51	16.16.29	N	6
		13.34. 5	3.26. 1	S	6
		14.59.17	6.24. 8	S	6
65.		4.55.17	17.35.54	N	6
A bright one following in the loins		7.47.42	14.19. 4	N	23
		15.55. 0	4.38.53	S	56
South. in the hip		9.55.52	9.39.50	N	3
North. in the hip		9.16.55	11.35. 5	N	6
70. That over the bright one in the loins		6.58.34	16.46. 2	N	5
North. of two in the thigh		11. 8.28	7.51.41	N	6
That before the hindermoſt claw		18. 0.40	7.39. 5	S	4
		15.54. 0	2.22.53	S	6
		16.25.40	2. 33.21	S	7
75. In the ham		15.12.46	1.40.53	N	45
South. in the thigh		14. 3.19	6. 5.10	N	4
		17.41.14	2.16.55	S	56
		16.48.18	0. 0.35	N	6
		12. 4.22	11.41.39	N	7
80.		17.17.43	0.18. 5	S	78
		17.44.18	0.32. 7	S	8
More ſouth. as in the leg		18.12. 3	0.34. 4	S	4
		13.24.31	11. 8. 9	N	6
North. in the nail of the hind-foot		12.21.36	13.56.16	N	6
85. South. in the nail of the hind-foot		20.53.34	5.42.22	S	45
		14.19.48	10.23.53	N	6
		19.25.32	0.16. 9	N	6
		73.57. 2	12.53. 8	N	6
North. in the nail of the hind-foot		21.33.13	3. 3.35	S	4
90.		13.22.42	17.38. 0	N	6
That over the tail		15.29.21	17.18. 9	N	4
In the extremity of the tail		18. 9.35	12.16.51	N	12
That following the tail		19. 9.48	13.53.21	N	6

LEONINE VERSES, ſuch as rhyme at every hemiſtich, the middle ſyllable of each verſe correſponding to the laſt one.

LEONTICE, in botany, a genus of plants whoſe flower conſiſts of ſix oval acute petals, with ſix ſlender filaments topped with erect antheræ: the fruit is a large inflated berry, with one cell, containing a few globular ſeeds.

LEONTODON, in botany. See the article DANDELION.

LEONURUS, lion's-tail, in botany, a genus of plants whoſe flower is monopetalous and ringent, with four ſtamina, two of which are longer than the others: there is no pericarpium; but the ſeeds, which are oblong and angular, are contained in the bottom of the cup.

LEOPARD, a beaſt of prey, with the ſpots on the upper part of the body round, and the lower ones virgated. It is a very nimble, as well as fierce animal, ſo that ſcarce any thing eſcapes it.

Authors call the male purdus, and the female panthera.

LEOPARD'S BANE, doronicum, in botany. See the article *Leopard's* BANE.

LEPIDIUM, dittander, in botany, a genus of plants whoſe flower is detrapetalous and cruciform, with ſix ſubulated ſtamina: the fruit is a compreſſed ſpearſhaped pod, containing oblong ſeeds.

The common dittander, which grows wild in many places in England, has a very hot acrid taſte, like pepper; it is ſaid to incide groſs humours, opening obſtructions of the liver and ſpleen, and is accounted a great antiſcorbutic: when the leaves are eaten in the morning, faſting, they excite the appetite and help digeſtion. Some affirm, that the powder of the dried leaves, given in wine to half an ounce, in a morning, faſting, is excellent in the dropſy.

LEPIDOPTERA, in zoology, an order of inſects, with four wings, which are covered with imbricated ſquamulæ: add to this, that the mouth is commonly ſpiral.

Under this order, are comprehended the butterflies and phalenæ, or moths.

LEPROSY, *Lepra*, in phyſic, a higher degree of cutaneous diſorder than an itch, the ſame with lepra arabum. See ITCH, IMPETIGO, and ELEPHANTIASIS.

The word is derived from the Greek λεϖρα, ſignifying the ſame, and that from λεϖις a ſcale.

There is a wide difference between the itch and leproſy, and that ulcerous diſorder in which white ſordid ulcers, ſeizing principally the muſcular parts, ſuch as the back, arms, thighs, &c. diſcharge a putrid ſanies, and ſometimes appearing in one limb, and ſometimes in another, often continue for many years. Large quantities of worms are alſo found lodged within theſe ulcers, ſo that they can hardly be extirpated.

The lepra and elephantiaſis are diſeaſes nearly alike.

The method for the cure of theſe and ſuch like malignant diſorders, is to diſcharge the maſs of corrupt, glutinous, acrid humours, by ſufficient bleeding and abſtinence, by purges both gentle and draſtic, and then by a proper regimen. But if the growing and refractory ſtate of the diſeaſe raiſes a ſuſpicion of malignity, there are no remedies more powerful, if the patient's ſtrength permit, than mercury, and its preparation. Some make an unguent of live mercury thoroughly extinguiſhed with pomatum, adding flowers of ſulphur and camphire, with which the joints, ancles, &c. are to be well rubbed. But others chooſe a better and ſafer method of uſing mercury internally; whilſt, by a previous preparation of the body, by alteratives, correctors, and evacuants, mercurius dulcis, with double the quantity of crabs-eyes, and diaphoretic antimony, is duly exhibited. This intention is alſo anſwered by mercurius ſolaris and jovialis, of which a few grains, with conſerve of roſes, may be exhibited every morning, drinking in bed, after it, a pint of ſome proper decoction. Each of theſe methods require a very temperate air, a ſpare diet, and abſtinence from pinguious or boiled fleſh and acids.

But if the patient be either an infant, or too old, both the ancients and moſt judicious of the moderns have greatly extolled preparations of milk, eſpecially aſſes milk, the whey of cows and goats milk, and milk mixed with water.

Whenever theſe exanthematous diſorders are ſupported by a ſcorbutic lues, or hypochondraic affection, a much greater advantage will be procured, when the milk diet is ſo managed as to alleviate the other diſorder with which they are complicated: for which purpoſe, the beſt way is the due uſe of medicinal waters, eſpecially thoſe of a temperate kind, impregnated with a ſaline and ſpirituous principle. But if ſuch waters cannot be had, the end will be beſt anſwered by a decoction of ſuch herbs as depurate the blood, and are particularly deſtined to theſe diſorders, with milk or whey, both ſweet and ſomewhat ſour. *Hoffman.*

LEPUS, the hare, in zoology. See HARE.

LEPUS, in aſtronomy, a conſtellation of the ſouthern hemiſphere; comprehending twelve ſtars, according to Ptolemy; thirteen, according to Tycho; and nineteen in the Britannic catalogue.

LESSONS, among eccleſiaſtical writers, portions of the Holy Scripture, read in Chriſtian churches at the time of divine ſervice.

LETHARGY, *Lethargus*, in phyſic, a kind of diſorder, wherein the perſon affected labours under a heavy and perpetual ſleep, with ſcarce any interval of waking.

The word is derived from the Greek ληθη, ſleep, and αργος, ſlothful.

There are ſeveral ſpecies of this diſorder; the chief are coma vigil, coma ſomnolentum, carus, and a lethargy. See COMA, CARUS, &c.

LETHE, in the ancient mythology, one of the rivers of hell, ſignifying oblivion or forgetfulneſs; its waters having, according to poetical fiction, the peculiar quality of making thoſe who drank them entirely forget every thing that was paſt.

LETTER, *Litera*, a character either in print or writing, which men have agreed on to ſignify ſomething, by joining of which they make their thoughts known to one another.

The alphabet of every language conſiſts of a certain number of letters or characters, which have a different ſound, form, and ſignification. See ALPHABET.

The articulation of words, or formation of the ſeveral letters, begins when the breath has paſſed the throat; and is almoſt performed by the noſtrils, mouth, tongue, and lips.

Some ſay that Fohi, firſt king among the Chineſe, and 2950 years before Chriſt, invented letters, having writ in that language a book called Yexim. Others think, from mummies and obeliſks, that hieroglyphics were the firſt manner of writing, they being prior to Moſes, as moſt of the obeliſks and pyramids were made while the Iſraelites were in Egypt. The Chaldeans or Phœnicians, it is very likely, were the maſters of the Egyptians; whence it was, that thoſe letters were called Phœnician by the Greeks: yet, according to Diodorus Siculus, they only changed the form of letters.

Pliny will have the moſt ancient letters to have been the Aſſyrian, and that Cadmus, about two hundred and fifty years before the Trojan war, brought ſixteen of them from Phœnicia into Greece, namely, A, B, C, D, E, F, I, L, M, N, O, P, R, S, T, U, to which Palamedes, during the Trojan war, had added four, Θ, Ξ, Φ, Υ.

Simonides, Evander, and Demaratus, were the firſt that brought letters into Italy.

The Hebrews made a diviſion of their letters into guttural, viz. *a*, *h*, *ch*, *gn*, or *aleph*, *he*, *cheth*, *hain*; dental, as *z*, *s*, *r*, *zain*, *tſadde*, *reſh*; labial, *b*, *m*, *n*, *p*, *beth*, *mem*, *vau*, *phe*; and thoſe of the tongue, *d*, *t*, *l*, *n*, or *daleth*, *tau*, *lamed*, *nun*; and palatal, as *g*, *i*, *c*, *k*, *ghimel*, *jod*, *caph*, *coph*.

The letters F, G, H, K, Q, X, Y, Z, were formerly unknown to the Romans. One letter was intended to ſignify only one ſound, and not as at preſent, now to expreſs one ſound, and then another, which has introduced that confuſion which has rendered the learning of our modern tongue extremely difficult.

Grammarians diſtinguiſh their letters into vowels and conſonants; into mutes, diphthongs, liquids, and characteriſtics. Printers diſtinguiſh their letters into capital, majuſcule, initial, or upper-caſe letters, which ſerve for the titles of books, &c. and minuſcule, ſmall or lower-caſe letters, which are again divided into pearl, nonpareil, pica, and great canon.

Letters, again, are of various ſizes, each of which are ſometimes caſt with the Roman, ſometimes Italic, ſometimes an Engliſh, or black letter face. There are alſo bodies with the Greek, Hebrew, Arabic, the muſic face, &c.

A ſet or fount of any of theſe ſizes includes current letters, capitals, numeral figures, points, ſpaces, &c. See FOUNT.

Letters are the elements of grammar; an aſſemblage of theſe compoſes ſyllables, of thoſe words, and of theſe ſentences.

Numeral LETTERS, thoſe uſed inſtead of cyphers, in order to expreſs numbers, as C, D, I, L, M, V, X.

LETTER alſo denotes the ſame with epiſtle, a writing addreſſed to any perſon.

LETTER *of Attorney*, a writing authoriſing any perſon to do the ſame lawful act for another, as to give ſeizin of lands, receive debts, ſue a third perſon, &c.

LETTER *of Credit*, among merchants, is a letter wrote by a merchant or banker to his correſpondent abroad, requeſting him to credit the bearer as far as a certain ſum. See CREDIT.

LETTER *of Licence*, an inſtrument or writing granted by a perſon's creditors, allowing him a certain time for the payment of his debts; by which means, he is enabled to proſecute his buſineſs, without fearing an arreſt.

LETTER *of Mart*, or *Marque*, a letter granted to one of the king's ſubjects, under the privy ſeal, impowering him to make repriſals for what was formerly taken from him by the ſubjects of another ſtate, contrary to the law of mart. See MARQUE.

Monitory LETTERS. See MONITORY.

LETTERS-PATENT, or OVERT, are writings ſealed with the great ſeal of England, ſo called, becauſe they are open with the ſeal affixed to them. Theſe are granted to authoriſe a man to do, or enjoy, what of himſelf he could not do. See the article PATENT.

Pacific LETTERS, *Lateræ Pacificæ*, in church hiſtory, teſtimonial letters given by the biſhop, or chorepiſcopus, to their prieſts, when they had occaſion to travel abroad, certifying that the bearer was a catholic, and in communion with the church.

Paſchal LETTER, a letter written by the pope to all metropolitans, to inform them on what day Eaſter was to be celebrated.

LETTUCE, *Lactuca*, in botany, a well known genus of plants, the flower of which is compound and imbricated, containing a number of hermaphrodite corollulæ, which are monopetalous, ligulated, and truncated, and indented at the end in four or five parts: the ſeeds are oblong, acuminated, and crowned with down, and placed in the cup.

There are ſeveral ſorts of lettuce cultivated in gardens for culinary purpoſes, as the cabbage-lettuce, brown Dutch, imperial, white cos, black cos, green cos, &c. They are all ſown at different ſeaſons of the year, whereby there is a continual ſupply; but the moſt eſteemed ſort is the cos: theſe ſhould be protected in winter with glaſſes, otherwiſe they are liable to be deſtroyed in very wet or froſty weather. In March they may be tranſplanted in the open ground, where they may remain till they are cabbaged, and then they are fit for uſe; but if they are not inclinable to turn in, they ſhould be tied round their tops with baſs, &c. which will blanch and make them tender.

Lettuces, in general, are eaſy of digeſtion, they abate the acrimony of the humours, and quench thirſt; for which reaſon they are frequently uſed in ſummer ſeaſon: many take them to be anodyne, and to procure ſleep, which is done, not by any narcotic quality, but by relaxing the fibres and temperating the heat of the viſcera; they are good in dry conſtitutions, and help thoſe that are coſtive.

LEVARI FACIAS, is a writ directed to the ſheriff for levying a certain ſum of money upon the lands, &c. of a perſon who has forfeited his recognizance.

LEVATOR, in anatomy, a name applied to ſeveral muſcles in the body, that ſerve to raiſe the parts to which they belong. See ELEVATOR.

LEVATOR *ſcapulæ proprius*, in anatomy, or rather, according to Winſlow, *angularis*, is a long, and pretty thick muſcle, about two fingers in breadth, lying above the ſuperior angle of the ſcapula, along the poſterior lateral part of the neck of that bone. It is inſerted above in the tranſverſe apophyſes of the four firſt vertebra of the neck, by four fleſhy branches ending in ſhort tendons. From thence theſe branches run down a little obliquely, and then uniting are inſerted into the ſuperior angle of the ſcapula and in the edge of its baſis, and from thence to the ſmall triangular ſpace, being there covered a little by the rhomboides: it is alſo covered by the trapezius. By its inſertion in the ſuperior angle of the ſcapula, it moderates the deſcent of that angle, while the trapezius and ſerratus major raiſe the acromium. Afterwards, when theſe two muſcles ceaſe to act, the angularis raiſes the ſuperior angle, and by that means depreſſes the acromium.

LEVATORES *Ani*, in anatomy, are muſcles that ariſe fleſhy from each ſide of the oſſa pubis, internally within the pelvis, as alſo from part of the os iſchium and ſacrum; from thoſe places, like lines drawn from a circumference towards a center, its fibres deſcend, over the muſculi marſupiales, to their implantation at the lower end of the inteſtinum rectum in the anus. They chiefly ſerve to ſuſpend and draw the anus upwards, leſt the fæces ſhould be burdenſome to the ſphincter. In their deſcent, on each ſide forwards, from the oſſa pubis, they paſs cloſe over the glandulæ proſtatæ, in a manner embracing them, whereby they are rendered capable of compreſſing them; and by a retraction of the anus, at the ſame time act on the veſiculæ ſeminalis, in order to promote the emiſſion of the ſemen in coitu. *Cowper*.

LEUCADENDRON, in botany, a genus of plants, the general corolla of which is uniform and convex; the partial one of which is oblong, hoary on the outſide, and compoſed of two petals; the upper petal is a long line or unguis, and its limb is lanceolated, undivided, and in its lower part is firmly joined to the lower petal; the lower petal has alſo a long unguis of a linear figure, but three times as broad as that of the upper petal; the cup, ſcarce at all altered, ſerves inſtead of a pericarpium, and contains a ſingle roundiſh ſeed, coronated with hairs.

LEUCOIUM, in botany, a genus of plants whoſe flower is ſpreading, and divided into ſix oval petals, joining at their baſe: the ſtamina are ſix very ſhort briſtly filaments, topped with oblong quadrangular antheræ: the fruit is a turbinated capſule, formed of three valves, with three cells, which are filled with roundiſh ſeeds.

LEVEL, an inſtrument to draw a line parallel to the horizon, whereby the difference of aſcent or deſcent between ſeveral places may be found, for conveying water, draining fens, &c.

The word is derived from the Latin, *libella*, the croſs beam in a balance, which, to be juſt, muſt ſtand exactly horizontal.

Air LEVEL, that which ſhews the line of level by means of a bubble of air incloſed with ſome liquor in a glaſs tube, whoſe two edges are ſealed hermetically. When the bubble fixes at a mark made exactly in the middle of the tube, the plane where it is fixed is level; otherwiſe the bubble will riſe to one end.

The liquor with which the tube is filled is of oil of tartar, or aqua-ſecunda; theſe not being liable to freeze.

Air LEVEL, with ſights, conſiſts of an air level about eight inches long, and ſeven or eight in diameter, ſet in a braſs tube, with an aperture in the middle. The tubes are carried in a ſtrong ſtraight ruler, a foot long, at whoſe ends are fixed two ſights exactly perpendicular to the tubes, and of an equal height, having a ſquare hole, formed by two fillets of braſs, croſſing each other at right angles, in the middle of which is drilled a very little hole, through which a point on a level with the inſtrument is deſcribed.

The braſs tube is faſtened on the ruler by means of two ſcrews; one of which ſerves to raiſe or depreſs the tube at pleaſure, to bring it to a level. The top of the ball and ſocket is rivetted to a little ruler that ſprings, one end of which is faſtened with ſcrews to the great ruler, and the other end has a ſcrew ſerving to raiſe or depreſs the inſtrument when nearly level.

The following is a more commodious inſtrument.

Air LEVEL, with teleſcope ſights; this level only differs from the laſt, in that, inſtead of plain ſights, it carries a teleſcope.

This was invented by M. Huygens; which has this advantage, that it may be inverted by turning the rule and teleſcope half round; and then, if the hair cut the ſame point that it did before the turn, it is a proof that the operation is juſt.

It may be obſerved, that one may add a teleſcope to any kind of level, by applying upon a parallel to the baſe or ruler, when there is occaſion to take the level of remote objects.

Artillery-Foot LEVEL, in gunnery, is in form of a ſquare, having its two legs or branches of an equal length, at a juncture whereof is a little hole, whence hangs a thread and plummet, playing on a perpendicular line in the middle of a quadrant. It is divided into twice 45 degrees from the middle.

This inſtrument may be uſed on other occaſions, by placing the ends of its two branches on a plane; for when the thread plays perpendicularly over the middle diviſion of the quadrant, that plane is aſſuredly level. To uſe it in gunnery, place the two ends on the piece of artillery, which you may raiſe to any propoſed height, by means of the plummet, whoſe thread will give the degree above the level.

Carpenter's and Paviour's LEVEL, conſiſts of a long ruler, in the middle whereof is fitted, at right angles, another ſomewhat bigger, at the top of which is faſtened a line, which, when it hands over a fiducial line at right angles with the baſe, ſhews that the ſaid baſe is horizontal. Sometimes this level is all of one board.

Gunner's LEVEL, for levelling cannons and mortars, conſiſts of a triangular braſs-plate, about four inches high, at the bottom of which is a portion of a circle, divided into 45 degrees, which number is ſufficient for the higheſt elevation of cannons and mortars, and for giving ſhot the greateſt range: on the center of this ſegment of a circle is ſcrewed a piece of braſs, by means of which it may be fixed or ſcrewed at pleaſure; the end of this piece of braſs is made ſo as to ſerve for a plummet and index, in order to ſhew the different degrees of elevation of pieces of artillery. This inſtrument has alſo a braſs-foot, to ſet upon cannons or mortars, ſo that when theſe pieces are horizontal, the inſtrument will be perpendicular. The foot of this inſtrument is to be placed on the piece to be elevated, in ſuch a manner, as that the point of the plummet may fall on the proper degree: this is what they call levelling the piece.

Maſon's LEVEL, is compoſed of three rules, ſo joined as to form an iſoſceles-rectangle, ſomewhat like a Roman A, at the vertex whereof is faſtened a thread, from which hangs a plummet, that paſſes over a fiducial line, marked in the middle of the baſe, when the thing, to which the level is applied, is horizontal: but declines from the mark, when the thing is lower on one ſide than on the other.

Plumb or *Pendulum* LEVEL, that which ſhews the horizontal lines by means of another line perpendicular to that deſcribed by a plummet or pendulum. This inſtrument conſiſts of two legs or branches, joined together at right angles, whereof that which carries the thread and plummet is about a foot and a half long; the thread is hung towards the top of the branch, at the point; the middle of the branch where the thread paſſes is hollow, ſo that it may hang free every where; but towards the bottom, where there is a little blade of ſilver, whereon is drawn a line perpendicular to the teleſcope, the ſaid cavity is covered by two pieces of braſs, making as it were a kind of caſe, leſt the wind ſhould agitate the thread, for which reaſon the ſilver-blade is covered with a glaſs, that it may be ſeen when the thread and plummet play upon the perpendicular: the teleſcope is faſtened to the other branch of the inſtrument, and is about two feet long; having an hair placed horizontally acroſs the focus of the object-glaſs, which determines the point of the level. The teleſcope muſt be fitted at right-angles to the perpendicular. It has a ball and ſocket by which it is faſtened to the foot, and was invented by Mr. Picard.

Reflecting LEVEL, that made by means of a pretty long ſurface of water, repreſenting the ſame object inverted which we ſee erected by the eye, ſo that the point where theſe two objects appear to meet, is a level with the place where the ſurface of water is found. This is the invention of Mr. Mariotte.

There is another reflecting level, conſiſting of a mirror of ſteel, or the like, well poliſhed, and placed a little before the object-glaſs of a teleſcope, ſuſpended perpendicularly. This mirror muſt make an angle of 45° with the teleſcope, in which caſe the perpendicular line of the ſaid teleſcope is converted into a horizontal line, which is the ſame with the line of level. This is the invention of M. Caſſini.

Water-LEVEL, that which ſhews the horizontal line by means of a ſurface of water or other liquor, founded on this principle, that water always places itſelf level. See the article FLUID.

The moſt ſimple is made of a long wooden trough, or canal, whoſe ſides are parallel to the baſe, ſo that being equally filled with water, its ſurface ſhews the line of level.

It is alſo made with two cups fitted to the two ends of a pipe, three or four feet long, about an inch in diameter, by means whereof the water communicates from the one to the other cup; and this pipe being moveable on its ſtand by means of a ball and ſocket, when the two cups become equally full of water, their two ſurfaces mark the line of level.

This inſtrument, inſtead of cups, may alſo be made with two ſhort cylinders of glaſs three or four inches long, faſtened to each extreme of the pipe with wax or maſtic. Into the pipe is poured ſome common or coloured water, which ſhews itſelf through the cylinders, by means whereof the line of level is determined; the height of the water, with reſpect to the center of the earth, being always the ſame in both cylinders: this level, though very ſimple, is yet very commodious for levelling ſmall diſtances.

LEVELLING, the finding a line parallel to the horizon, at one or more ſtations, and ſo to determine the height of one place with regard to another. See LEVEL.

A truly level ſurface is a ſegment of any ſpherical ſurface which is concentric to the globe of the earth. A true line of level is an arch of a great circle which is imagined to be deſcribed upon a truly level ſurface.

The apparent level is a ſtraight line drawn tangent to an arch or line of true level. Every point of the apparent level, except the point of contact, is higher than the true level.

When a proper ſtation for the level has been pitched upon between the two points, the two heights obſerved at that ſtation muſt be written down in two columns, namely, under the firſt column thoſe obſerved when the eye was from the ſpring, or towards the point, which may be called back-ſights; and under the ſecond column thoſe obſerved when the eye was next the ſpring, or the fore-ſights.

Having ſummed up the height of each column, ſeparately, ſubtract the leſſer from the greater, and the remainder will be the difference of level between the two ſtations.

If the diſtance of the two points be required, add all the diſtances meaſured together, and, dividing the difference of height by the yards of the diſtances, for each 200 yards you will have a deſcent of about two inches nine lines.

Dr. Halley ſuggeſts a new method of levelling; which is performed wholly by the barometer, in which the mercury is found to be ſuſpended to ſo much the leſs height, as the place is farther remote from the center of the earth. Hence it follows, that the different height of the mercury in two places gives the difference of level.

Mr. Derham, from ſome obſervations at the top and bottom of the Monument in London, found that the mercury fell one tenth of an inch at every eighty-two feet of perpendicular aſcent, when the mercury was at thirty inches: Dr. Halley allows of one tenth of an inch for every thirty yards; which, conſidering how accurately barometers are now made, he thinks this method ſufficiently exact to take levels for the conveyance of water, and leſs liable to errors than the common levels.

He alſo found a difference of three inches eight tenths between the height of the mercury at the top and bottom of Snowdon-hill, in Wales.

For the common occaſions of levelling, ſet a pole upright in a ſpring, pond, &c. and mark how many feet and inches are above water: Then ſet up another pole of equal length with the other, in the place to which the water is to come. Place the the center of a quadrant on the top of this laſt pole, the plummet hanging free; ſpy through the ſights the top of the pole in the water, and if the thread cuts any degree of the quadrant, the water may be conveyed by a pipe laid in the earth. If you cannot ſee from one extreme to the other, the operation may be repeated.

LEVER, in mechanics, is an inflexible line, rod, or beam, moveable about or upon a fixed point, called the prop or fulcrum, upon one end of which is the weight to be raiſed; at the other end is the power applied to raiſe it, as the hand, &c.

Since the momentum of the weight and power are as the quantities of matter in each multiplied by their reſpective celerities: and the celerities are as the diſtances from the center of motion, and alſo as the ſpaces paſſed through in a perpendicular direction in the ſame time; it muſt follow, that there will be an equilibrium between the weight and power, when they are to each other reciprocally as the diſtances from the center, or as the celerities of the motions, or as the perpendicular aſcent or deſcent in the ſame time; and this univerſally in all mechanical powers whatſoever, which is therefore the fundamental principle of all mechanics.

LEVERET, among ſportſmen, denotes a hare in the firſt year of her age.

LEVIGATION, in pharmacy and chemiſtry, the reducing hard bodies to an impalpable powder, by grinding them with water on a porphyry, or marble.

LEVITE, in a general ſenſe, means all the deſcendants of Levi, among whom were the Jewiſh prieſts themſelves, who, being deſcended from Aaron, were likewiſe of the race of Levi: but it is more particularly uſed for an order of officers in that church, who were employed in performing the manual ſervice of the temple, ſuch as in fetching wood, water, and other things neceſſary for the ſacrifices; and in ſinging and playing upon inſtruments of muſic.

LEVITICUS, a canonical book of the Old Teſtament, ſo called from its containing the laws and regulations relating to the prieſts, Levites, and ſacrifices.

The ſeven firſt chapters of this book preſcribe the ceremonies to be obſerved in offering burnt-ſacrifices, meat-offerings, peace-offerings, &c. then Moſes relates in what manner the prieſts were to be conſecrated, and the misfortune of Nadab and Abihu, who offered incenſe to the Lord with ſtrange fire. Upon this occaſion, he preſcribes ſome laws concerning the mourning of the prieſts, and forbids their drinking wine, while they were employed in the ſervice of the tabernacle. In the eleventh, twelfth, thirteenth, and fourteenth chapters, he lays down rules for diſtinguiſhing clean and unclean beaſts, and concerning the leproſy, purifications, &c. appoints the ceremonies to be obſerved upon the great day of expiation: regulates the degrees of kindred within which perſons were allowed or forbidden to marry: prohibits alliances with the Canaanites, and alſo idolatry, theft, perjury, calumny, &c. In the twenty-third chapter, he takes notice of the principal annual feſtivals, the paſſover, pentecoſt, &c. preſcribes what was to be obſerved in the ſabbatical and jubilee-years, and concludes with regulations concerning vows and tythes.

LEVITY, in phyſiology, the privation or want of weight in any body, when compared with another that is heavier than it, in which ſenſe it ſtands oppoſed to gravity. See the articles GRAVITATION and GRAVITY.

LEVY, in law, ſignifies to gather or collect, as to levy money; and to levy a fine of lands, is the paſſing a fine.

LEX, LAW. See the article LAW.

LEXICON, the ſame with dictionary. It is generally uſed in ſpeaking of Greek dictionaries.

The word is Greek, λεξικον, and derived from λεξις, a word.

LIBATION, a religious ceremony among the ancient pagans, which conſiſted in an effuſion of liquors poured on the head of the victims prepared for ſacrifice.

Libations were alſo in uſe among the Hebrews, who poured a tun of wine on the victim after it was killed, and the ſeveral pieces of the ſacrifice were laid on the altar, ready to be conſumed in the flames.

LIBEL, injurious reproaches or accuſations againſt a perſon, written and publiſhed in order to expoſe him to public contempt, hatred, or ridicule.

Libel, in the law of Scotland, implies an indictment. See Indictment.

LIBELLA, or Libellula, in the hiſtory of inſects, a genus of four-winged flies, called in Engliſh dragon-flies, or adder-flies; the characters of which are, that they are furniſhed with jaws, the antennæ are ſhort, and the tail terminated by a kind of forceps.

LIBERATE, in law, a writ that lies for the payment of a penſion, or annual ſum, granted under the great ſeal, being directed to the treaſurer and chamberlains of the exchequer.

LIBERIA, in Roman antiquity, a feſtival obſerved on the ſixteenth of the calends of April, at which time the youth laid aſide their juvenile habit, for the toga virilis, or habit peculiar to grown men. See the articles Toga.

LIBERTUS, in Roman antiquity, a perſon who from being a ſlave had obtained his freedom. See Manumission.

LIBERTY, *Libertas*, in general, denotes a ſtate of freedom, in contradiſtinction to ſlavery. See the article Freedom.

According to Cicero, liberty is the power of living as a man pleaſes, or without being controlled by another.

In a legal ſenſe, liberty ſignifies ſome privilege that is held by charter or preſcription.

LIBRA, the ballance, in aſtronomy, one of the twelve ſigns of the zodiac, the ſixth in order; ſo called becauſe, when the ſun enters it, the days and nights are equal, as if weighed in a ballance.

Libra, in Roman antiquity, a pound weight; alſo a coin, equal in value to twenty denarii.

LIBRARY, an edifice, or apartment, deſtined for the placing of books; or the books themſelves lodged therein.

The word is formed from the Latin *libraria*, which is derived from *liber*, a book.

LIBRATION, in aſtronomy, an apparent inequality in the motion of the moon, by which ſhe ſeems to librate or waver about her own axis, ſometimes from the eaſt to the weſt, and ſometimes from weſt to eaſt. See the article Moon.

Libration *of the Earth* is that motion whereby the earth is ſo retained in its orbit, that its axis continues conſtantly parallel to the axis of the world.

LICENCE, in law, an authority given to a perſon to do ſome lawful act.

LICENTIATE, one who has obtained the degree of a licence.

LICHEN, *Cinereus Terreſtris*, aſh-coloured ground liver-wort, in botany, a ſpecies of moſs, conſiſting of roundiſh, pretty thick leaves, divided about the edges into obtuſe ſegments, flat above, of a reticular texture underneath, faſtened to the earth by ſmall fibres; when in perfection, of an aſh-grey colour; by age, turning darker-coloured or reddiſh. It grows on commons and open heaths, ſpreads quickly on the ground, and is to be met with at all times of the year, but is ſuppoſed to be in its greateſt vigour about the end of autumn.

This herb is ſaid to be a warm diuretic. It is particularly celebrated as a preſervative againſt the terrible conſequences of the bite of a mad dog: an account of the remarkable efficacy, in this intention, of a powder compoſed of the dry leaves and black pepper, was communicated to the Royal Society by Mr. Dampier, and publiſhed in N°. 237 of the Philoſophical Tranſactions. This powder was afterwards inſerted, in the year 1721, into the London Pharmacopœia, at the deſire of Dr. Mead, who had large experience of its good effects, and who declares, that he had never known it to fail, where it had been uſed, with the aſſiſtance of cold bathing, before the hydrophobia began.

LICTORS, *Lictores*, in Roman antiquity, the ſerjeants or beadles who carried the faſces before the ſuperior magiſtrates: it was alſo a part of their office to be the public executioners in beheading, ſcourging, &c.

LIEGE, in law, a term ſometimes uſed for liege-lord, or one who owns no ſuperior; and ſometimes for liege-man, or one who owes allegiance to the liege-lord. In our ſtatutes, the king's ſubjects are ſometimes called lieges, or liege-people.

LIEN, the ſpleen, in anatomy. See Spleen.

LIENTERY, in medicine, a diſorder proceeding from a preternatural ſmoothneſs of the inteſtines, in conſequence of which, what is diſcharged by ſtool, greatly reſembles the aliments, both in colour and ſubſtance.

The cauſe of this diſorder, according to Fernelius, is not an obſtructed or hindered diſtribution of the aliments, but a weakneſs of the firſt concoction, in conſequence of which the aliments paſs through the inteſtines unchanged.

The principal intention of cure in a lientery, according to Etmuller, is to ſtrengthen and corroborate the ſtomach; which end is moſt effectually obtained by rhubarb, preparations of coral, and quinces. All the medicines recommended againſt vomiting, are alſo proper in this diſorder. Waldſchmidius informs us, that the moſt ſimple and eaſily prepared ſtomachics are more beneficial in a lientery, than thoſe of the compound kind. The moſt proper ſtomachics, according to that author, are preſerved nutmeg, preſerved ginger, the white of an egg boiled with vinegar, and wormwood-wine prepared with maſtich.

LIEUTENANT, an officer who ſupplies the place, and diſcharges the office of a ſuperior in his abſence. Of theſe, ſome are civil, as the lords-lieutenants of kingdoms, and the lord-lieutenants of counties; and others are military, as the lieutenant-general, lieutenant-general of the artillery, lieutenant-colonel, lieutenant of the Tower, lieutenant of horſe, foot, ſhips of war, &c.

LIFE, *Vita*, in general, a kind of active operative exiſtence, and conceived to conſiſt in motion.

Life is uſed in a more particular ſenſe to ſignify the duration of an animal's being; or the ſpace of time that paſſes between its birth and death.

Life-Annuities. See the article Interest.

LIFTS, in the ſea-language, certain ropes that reach from the maſt-heads to the yard-arms of a ſhip, to keep the ſail-yards parallel to the deck, or as ſeamen term it, ſquare by the lifts, i. e. parallel to the horizon, when the ſhip is upright, or at right angles with the maſt.

The lifts are alſo employed to top the yards, i. e. to lift one yard-arm higher than the other, by drawing in one lift, and ſlackening the other.

Topping-Lift. See Topping-*Lift*.

LIGAMENT, in anatomy, a ſtrong compact ſubſtance, ſerving to join two bones together.

A ligament is more flexible than a cartilage, not eaſily ruptured or torn, and does not yield, or at leaſt very little, when pulled.

LIGATURE, in ſurgery, is a cord, band, or ſtring; or the binding any part of the body with a cord, band, fillet, &c. whether of leather, linen, &c.

Ligatures are uſed to extend and replace bones that are broken or diſlocated; to tie the patients down in lithotomy and amputations; to tie upon the veins in phlebotomy, or the arteries in amputations, or in large wounds; to ſecure the ſplints that are applied to fractures; to tie up the proceſſes of the peritonæum, with the ſpermatic veſſels in caſtration; and laſtly, in taking off warts or other excreſcences by ligature. For the manner of uſing them, ſee Lithotomy, Fracture, &c.

LIGHT, *Lux*, in philoſophy, certain inconceiveable ſmall particles of matter of different magnitudes, which are emitted or reflected from every point in the ſurface of a luminous body in right lines, and in all directions, with an unparalleled velocity, and whoſe power and intenſity decreaſe as the ſquares of the diſtances increaſe.

The Greeks, and after them all the barbarous nations, who learned of them to reaſon and to err, have ſaid from age to age through a long ſeries of time, "Light is an accident, which accident is the act of tranſparent as tranſparent; colours are what move tranſparent bodies. Luminous and coloured bodies have qualities like thoſe they excite in us, according to the maxim, that nothing can give what it has not. In fine, light and colours are a mixture of the hot, cold, dry, and humid; for the humid, dry, cold, and hot, being the principles of all things, colours muſt neceſſarily be compoſed of them." See the article Colour.

This is the abſurd jargon which the profeſſors of ignorance, paid by the public, have made human credulity revere ſo many ages; which manner of reaſoning prevailed almoſt in all things down to the time of Galileo and Deſcartes. Even long after them, the ſame traſh, the diſgrace of human underſtanding, ſubſiſted in many ſchools.

All the pretended philoſophers therefore having gueſſed at nature at a venture through the veil under which ſhe lay concealed, Deſcartes at length came, and diſcovered a corner of this great veil. He ſaid, "Light is a fine and ſubtile matter, diffuſed univerſally, that ſtrikes our eyes. Colours are ſenſations excited in us by God, according to the motions which tranſmit that matter to our organs." Thus far Deſcartes was in the right, and ought either to have ſtopped there, or, in advancing, to have taken experiment for his guide. But he was poſſeſſed with a deſire of eſtabliſhing a ſyſtem. That paſſion had the ſame effect on this great man, as paſſions have on all men; they hurry them beyond their principles.

According to Deſcartes, the light does not proceed to our eyes from the ſun, but in a globulous matter diffuſed univerſally, which the ſun impels, and which preſſes upon our eyes as a ſtaff puſhed at one end preſſes the ſame inſtant upon another. This appeared plauſible, but is not therefore the leſs falſe. Deſcartes, however, was ſo fully convinced of this principle, that, in his ſeventeenth letter of the third volume, he poſitively ſays, and repeats it, "I confeſs that I know nothing of philoſophy, if the light of the ſun is not tranſmitted to our eyes in an inſtant." And indeed we muſt own, that, as great a genius as he was, he knew very little of true philoſophy, and wanted the experiments of the preceding age. That age is as much ſuperior to Deſcartes, as Deſcartes was to antiquity.

If light were always diffuſed, and always exiſting in the air, we ſhould ſee as clearly in the night as we do in the day; becauſe the ſun below the horizon would continually impel the globules on all ſides, and the impreſſion equally affect our eyes.

That light is a material ſubſtance, and what we properly call body, is not to be doubted; becauſe we find it ſomething that has motion, or is propagated in time; ſomething that acts upon our bodies, and produces great alterations and changes in their natures and forms. It is ſomething that bodies act upon, by reflecting, inflecting, and refracting it on their ſurfaces, and in their pores: and it would appear to have weight, and all other ſenſible qualities of common matter, were it not that the ſmallneſs of its quantity renders them entirely imperceptible to us. Nor are we to conſider light only as a body, but as the moſt active principle or moſt general agent in nature; and it is, perhaps, the true primum mobile, or the ſpring of motion and action in all other bodies. Were the particles of light to be annihilated, we ſhould ſee no marks or foot-ſteps of fire or heat remaining, and therefore no power of motion in bodies; but all things would put on the appearance of lifeleſs inert matter, rigid and inflexible, as it would be abſolutely cold and dark.

The divine wiſdom and providence appear, perhaps, in nothing ſo remarkably as in the extreme ſubtilty of the particles of light: without this qualification it could not have pervaded the pores of bodies, and ſo we could have had none of thoſe which we call diaphanous or tranſparent ſubſtances, and every thing but the ſurface of a body would have been concealed from the ſight of mankind. Again, the velocity of a body is always as the quantity of matter inverſely; and therefore, the ſmaller the body, the greater velocity it is ſuſceptible of from the ſame force; whence it comes to paſs that light is thus qualified to be tranſmitted through immenſe diſtances in a ſmall and inſenſible part of time; which thing was quite neceſſary, according to the preſent frame and ſtate of nature.

But laſtly, it was abſolutely neceſſary that the particles of light ſhould be ſo exceeding ſmall, that, when compounded with its velocity, it ſhould produce no ſenſible force, as it muſt otherwiſe have done, and which, therefore, could not have been borne by the tender and delicate tecture of the ſeveral parts of vegetable and animal bodies. To give an example: the velocity of a particle of light is found to be at the rate of 897600000 feet per ſecond; ſuppoſe its matter to be but one millionth part of a grain, then its force to ſtrike an object would be as $\frac{897600000}{1000000} = 897,6$ feet per ſecond for one grain; or it would ſtrike with the ſame force that one grain weight would do falling from half the height, viz. through 448,8 feet; which we ſhould find to be very great, was the experiment to be made on the ſenſible coats of the eye.

Since the weight of bodies is proportioned to the quantity of matter, it follows, that where the latter is diminiſhed indefinitely, the former will be ſo too; therefore, the weight of light muſt be inſenſible to ever ſo great a quantity of it. Dr. Boerhaave cauſed a globe of iron, twelve inches in diameter, to be heated red hot, and ſuſpended at the end of a very exact balance, and counterpoiſed by weights at the other end very nicely, and thus let it hang till all the particles of heat or light were eſcaped, when he found the equilibre of the balance no ways altered; which plainly proves the above theſis.

That the particles of light have not only magnitude, but that in different degrees alſo, is another, and perhaps the moſt ſubtile, diſcovery of the Newtonion philoſophy. The comparative terms of greater and leſſer are now as applicable to the particles of light, as to any other bodies. This is abſolutely proved by the different refrangibility they are found to have in paſſing through a priſmatic figure of glaſs or water; for the power of the priſm detains the iſſuing particle, and draws it a little towards the ſurface; and, ſince this power is the ſame, it would have the ſame effect on all the particles of light, if they were all of an equal magnitude, becauſe they have all an equal velocity. But ſince this effect is different among the particles, ſome being detained and drawn aſide to a greater diſtance than others, it follows, they muſt be leſs in magnitude, to become more ſubject to the influence of the attracting ſurface; in like manner as the electric effluvia will act upon and agitate very ſmall and light bodies, much ſooner and more eaſily than they can move thoſe which are larger.

If light were not reflected from every point in the ſurface of a body in all directions every way, there might be aſſigned a point of ſpace where a ray of light, from ſuch a point in the ſurface, does not come; and there the ſaid point of the ſurface could not be viſible: but becauſe the eye can find no point of ſpace in all the viſible hemiſphere reſpecting that point, but where it is viſible; therefore, a ray of light is reflected from that point to every part of ſpace, from whence a right-line to that point can be drawn.

That the rays of light proceed in a right-lined direction, is evident from hence, that whatever the figure of the body be, if it be held perpendicular to the rays of light, it will always caſt a ſhadow of the ſame figure againſt a parallel plane. Thus a circle will produce a circular ſhadow, a triangle a triangular one, and ſo on; which plainly ſhews that the rays of light paſs by the extremities of theſe bodies in right-lined directions, excepting theſe only which paſs contiguous to the edges of the body; for they will be a little inflected, which will cauſe the extremity of the ſhadow to be not ſo diſtinct and well defined as it otherwiſe would be; of which we ſhall take farther notice hereafter.

As all the other affections of light, ſo that of its velocity was utterly unknown to all the ancient, and moſt of the modern philoſophers, who, before the time of Mr. Romer, were of opinion that the motion of light was inſtantaneous, or that it was propagated through immenſe ſpaces in an inſtant. But Mr. Romer, and other philoſophers about this time, making frequent obſervations on the eclipſes of Jupiter's moons, found that the time of theſe eclipſes did not correſpond to the calculations founded upon the aſtronomical tables; where the times are all calculated for the diſtance of the center of the ſun, and conſequently where the eye of the ſpectator muſt be ſuppoſed to be in viewing the ſaid eclipſes, occultations, &c. of Jupiter's moons.

But this, though a ſufficient diſcovery or proof of the progreſſive motion of light, was yet but an experiment in the groſs, and not accurate to determine or define the true rate or velocity which properly belonged to light: the ſolution of this noble problem was reſerved for Dr. Bradley, who by reiterated and certain experiments, obſerved, that the bright ſtar in the head of Draco, appeared $39''$ more northerly in September than in March, juſt the contrary way to what it ought to appear by the annual parallax of the ſtars, which muſt ariſe from the velocity of light bearing ſome proportion to that of the annual motion of the earth. See the article ABERRATION *of the Stars*.

And hence it has been found, that the velocity of light is 10210 times greater than the velocity of the earth in her orbit. But the velocity of the earth is known, which is about 500,000,000 miles in 365 days, or about 56,000 miles per hour; whence the velocity of light will be found to be ſuch as carries it through the ſpace of 170,000 miles (or 897,600,000 feet) in one ſecond; and, therefore, it will paſs from the ſun to us in $8'$ and $13''$.

If a cannon will throw a ball one mile perpendicular height, or 5280 feet, the velocity with which it goes from the cannon's moth is the uniform velocity of 10,560 feet per $18\frac{1}{4}''$, which is the time of the perpendicular aſcent or deſcent, and therefore the velocity of the cannon-ball is 578 feet per ſecond. Whence the velocity of light is, to that of the cannon-ball, as 897,600,000 to 578, or as 1,550,000 to 1, nearly.

The doctor found, that the parallax of the fixed ſtars, inſtead of amounting to many ſeconds, as ſome have deduced from their obſervations, does not make one ſecond; and from thence it follows, that the above-mentioned ſtar, in Draco, is about 400,000 times farther from us than the ſun; and, conſequently, that the light takes up above $493'' \times 400{,}000 = 197{,}200{,}000$ ſeconds, which is more than ſix years, in coming from that ſtar to us.

For the properties of reflected and refracted light, ſee the articles REFLECTION and REFRACTION.

LIGHT is alſo uſed to denote the diſpoſition of objects, with regard to the receiving of light: thus, the doors, windows, &c. of houſes, are called lights.

For the lights and ſhades of painting, &c. ſee CLARO-OBSCURO.

LIGHTER, a ſort of veſſel or large boat employed in harbours or rivers, particularly the Thames, to bring goods to and from a ſhip in the act of lading and delivering the cargo. See CARGO.

LIGHT-HOUSE, among ſailors, a little houſe erected on a cape, hill, or promontory, near the ſea-coaſt, for the direction of ſhips which are paſſing that way: for this purpoſe it is furniſhed with great lights at the top, and has always ſomebody to watch them. As the lights may be ſeen at a great diſtance, they are very ſerviceable in guiding ſhips which are at a loſs to know where they are.

LIGHTNESS, or *Levity of* BODIES. See the article LEVITY

LIGHTNING, in phyſiology, the burſting of fire from a cloud.

From Mr. Franklin's experiments, it appears, that lightning is only electrical fire drawn off from the clouds; and, in effect, this electricity has been collected, during thunder, in iron bars, or on tin tubes, in many parts of Europe. See ELECTRICITY.

Thunder, then, or lightning, is, in the hand of nature, what electricity is in ours; the wonders which we now exhibit at pleaſure, are only little imitations of thoſe great effects which frighten us. A cloud prepared by the action of winds, by heat, by a mixture of exhalations, &c. is the electrified body; and watery clouds, or terreſtrial matter, the non-electrics which excite it. See the article THUNDER.

LIGULATED, among botaniſts, an appellation given to ſuch floſcules as have a ſtraight end, turned downwards, with three indentures, but not divided into ſegments.

LIGUSTICUM, lovage, in botany, a genus of plants, the general corolla of which is uniform, and the ſingle flowers conſiſt each of five lanceolated petals, bent inwards at the points: the fruit is naked, oblong, angulated, ſulcated, and ſeparable into two parts; and containing two oblong, ſmooth ſeeds, plane on one ſide, and ſtriated on the other.

LIGUSTRUM, privet, in botany, a genus of trees, with a funnel-faſhioned flower, quadrifid or quinquifid at the limb: the fruit is a globoſe ſmooth berry, with only one cell, containing four ſeeds, convex on one ſide, and angulated on the other.

LILAC, in botany, a genus of trees, otherwiſe called ſyringa. See SYRINGA.

LILIACEOUS, an appellation given to ſuch flowers as reſemble that of the lily. See LILY.

LILIO-FRITILLARIA, a ſpecies of fritillary. See FRITILLARY.

LILIO-HYACINTHUS, a ſpecies of ſcilla or quill. See SCILLA.

LILIO-NARCISSUS, or AMARYLLIS, in botany, a genus of plants with a liliaceous flower, compoſed of ſix petals: its fruit is a ſuboval capſule with three cells, containing a great many ſeeds.

LILIUM, the lily. See LILY.

LILIUM *Convallium*, lily of the valley. See CONVALLIUM *Lilium*.

LILY, *Lilium*, in botany, the name of a large genus of plants, with a kind of bell-faſhioned flower, and is compoſed of ſix leaves, which are more or leſs expanded and bent back. The piſtil ſtands in the center of the flower, and finally becomes an oblong and trigonal fruit, which is divided into three cells, and contains a number of marginated ſeeds, arranged in a double order one on another. To this muſt be added, that the root is of a bulbous form, and is compoſed of a number of fleſhy ſcalesaffixed to an axis.

All ſorts of lilies and martagons are propagated by ſowing their ſeeds; and if the ſeeds are carefully ſaved from good flowers, the martagons very frequently afford very beautiful varieties.

The manner of ſowing them is this: ſome ſquare boxes ſhould be provided of about ſix inches deep, with holes bored in the bottoms to let out the wet; theſe muſt be filled with freſh, light, ſandy earth, and the ſeeds muſt be ſown on them pretty thick in the beginning of Auguſt, ſoon after they are ripe, and covered over about half an inch deep with light ſifted earth of the ſame kind. They ſhould be then placed where they may have the morning ſun; and if the weather prove dry, they muſt be watered at times, and the weeds carefully picked out. In the month of October, the boxes are to be removed to a place where they may have as much ſun as poſſible, and be ſecured from the north and north-eaſt winds. In ſpring the young plants will appear, and the boxes are then to be removed into their former ſituation; they ſhould be watered at times during the ſummer, and in Auguſt the ſmalleſt roots are to be emptied out of theſe boxes, and ſtrewed over a bed of light earth, and covered with about half an inch depth of light earth ſifted over them; they muſt here be watered and ſhaded at times, and defended from the ſeverity of the winter, by a light covering of ſtraw, or peas-haulm, in the hardeſt weather. In February, the ſurface of the bed ſhould be cleared, and a little light earth ſifted over it. When the leaves are decayed, the earth ſhould be a little ſtirred over the roots, and in the month of September following, a little light earth ſifted on. In the Sepber of the following year, the roots muſt be tranſplanted to the places where they are to remain, and ſet at eight inches diſtance, the roots being placed four inches below the ſurface: this ſhould be done in moiſt weather. They will now require the ſame care as in the preceding winters; and the ſecond after they are tranſplanted, the ſtrongeſt roots will begin to flower. The fine ones ſhould then be removed at the proper ſeaſon into flower-beds, and planted at great diſtances from one another, that they may flower ſtrong. *Miller's Gard. Dict.*

The roots of the white lily are emollient, maturating, and greatly ſuppurative. They are uſed externally in cataplaſms for theſe purpoſes with ſucceſs. The common form of applying them is boiled and bruiſed; but ſome prefer the roaſting them till tender, and then beating them to a paſte with oil, in which form they are ſaid to be excellent againſt burns. Gerard recommends them internally in dropſies. The flowers are alſo uſed in emollient cataplaſms; and the oil, made by inſolation, is of common uſe in pains and tumours of all kinds.

LILY *of the Valley*. See the article CONVALLARIA.

LIMB, in a general ſenſe, denotes the border or edge of any thing: thus we ſay, the limb of a quadrant, of the ſun, of a leaf, &c.

LIMB, in anatomy, an appellation given the extremities of the body, as the arms and legs. See ARM and LEG.

LIMBERS, or LIMBER-HOLES, in ſhip-building, ſmall holes in the lower part of the timbers of a ſhip, cloſe to the keel; the purpoſe of which is to let the water, which may have come in by a leak, have a free paſſage to the well, where the pumps are fixed to draw it out; for this purpoſe every floor-timber is fitted with two of theſe, viz. one on each ſide of the kelſon.

LIMBER-BOARDS, ſhort pieces of plank which form a part of the ceiling of a ſhip's floor cloſe to the kelſon, and immediately above the limber-holes: they can be occaſionally removed to clear the limbers, when they are filled or clogged with any filth, ſand, gravel, &c.

LIME, *Calx*, a ſoft friable ſubſtance, obtained by calcining or burning ſtones, ſhells, and the like.

LIME-TREE, the Engliſh name of the tilia. See TILIA.

LIMITS *of Equations*, in algebra, a method of diſcovering the limits of the root of equations, by which their ſolutions are much facilitated.

Let any equation be propoſed, and having put p, q, r, s, t, v, &c. for the known quantities of the terms thereof, under their ſigns changed, viz. that of the ſecond p, that of the third q, of the fourth r, of the fifth s, and ſo on. And the ſigns of the terms being rightly obſerved, make $p = a$, $pa + 2q = b$, $pb + qa + 3r = c$, $pc + qb + ra + 4s = d$, $pd + qc + rb + sa + 5t = e$, $pe + qd + rc + sb + ta + 6v = f$, and ſo on, obſerving the ſame law in the continuation of the ſeries; and a will be the ſum of the roots, b the ſum of the ſquares of each of the roots, c the ſum of the cubes, d the ſum of the biquadrates, e the ſum of the quadrato-cubes, f the ſum of the cubo-cubes, and ſo on. As in the equation $x^4 - x^3 - 19xx + 49x - 30 = 0$, where the known quantity or co-efficient of the ſecond term is -1, of the third -19, of the fourth $+49$; of the fifth -30: you muſt make $1=p$, $19=q$, $-49=r$, $30=s$. And there will thence ariſe $a=(p=)\,1$, $b=(pa+2q=1+38=)\,39$, $c=(pb+qa+3r=39+19-147=)\,-89$, $d=(pc+qb+ra+4s=-89+741-49+120=)\,723$: wherefore the ſum of the roots will be 1, the ſum of the ſquares of the roots 39, the ſum of the cubes -89, and the ſum of the biquadrates 723; hence the roots of that equation are 1, 2, 3, & -5, and the ſum of theſe $1+2+3-5=1$; the ſum of the ſquares, $1+4+9+25$, is 39; the ſum of the cubes, $1+8+27-125$, is -89; and the ſum of the biquadrates, $1+16+81+625$, is 723.

Now, to collect the limits, between which the roots of the equation ſhall conſiſt, if none is impoſſible, it will be neceſſary to obſerve, that when the ſquares of all the roots are affirmative, the ſum of the ſquares will be affirmative; and therefore greater than the ſquare of the greateſt root; and alſo that the ſum of the biquadrates of all the roots will be greater than the biquadrate of the greateſt root, and the ſum of the cubo-cubes greater than the cubo-cube of the greateſt root. Wherefore, to obtain that limit which no roots can paſs, find the ſum of the ſquare of the roots, and extract the ſquare root of that ſum, this root will be greater than the greateſt root of the equation; but to approach the greateſt root ſtill nearer, find the ſum of the biquadrates, and extract its biquadrate root; and for a third approximation, extract the cubo-cubical root of the ſum of the cubo-cubes of the roots.

LIMITS *of a Planet*, its excurſion from the ecliptic, or, which is the ſame thing, the points of its greateſt latitude.

LIMITATION, in law, ſignifies a certain ſpace of time allowed for bringing actions in.

LIMITATION *of Eſtate*, is the length of time an eſtate is to continue in the poſſeſſion of a perſon or family.

LIMITTED PROBLEM, a problem that admits but of one ſolution, as to make a circle paſs through three given points, not lying in the ſame right line.

LIMNING, the art of painting in water-colours, in contradiſtinction to painting, which is done in oil-colours. See PAINTING.

LIMON, the lemon-tree. See the article LEMON.

LIMOSELLA, in botany, a genus of plants whoſe flower is monopetalous and campanulated, divided at the top into five ſegments: the fruit is an ovate unilocular capſule, containing a great many ſeeds.

LIMPET, the Engliſh name of a ſhell-fiſh, called by authors patella. See PATELLA.

LINE, *Linea*, in geometry, a quantity extended in length only, without any breadth or thickneſs. It is formed by the flux or motion of a period. See FLUXION.

There are two kinds of lines, viz. right lines and curve lines.

Right lines are all of the ſame ſpecies, but curves are of an infinite number of different ſpecies. We may conceive as many as there may be different ratios between their ordinates and abſciſſes. See the articles ABSCISS and ORDINATE.

Curve lines are uſually divided into geometrical and mechanical; the former are thoſe which may be be found exactly in all their points; the latter are thoſe, ſome or all of whoſe points are not to be found preciſely, but only tentatively, or nearly.

Curve lines are alſo divided into the firſt order, ſecond order, third order, &c. See the article CURVE.

Lines conſidered as to their poſitions, are either parallel, perpendicular, or oblique, the conſtruction and properties whereof ſee under PARALLEL, &c.

Euclid's ſecond book treats moſtly of lines, and of the effects of their being divided and again multiplied into one another.

LINE, in geography, the ſame with equator. See the article EQUATOR.

LINES, in aſtronomy, are, 1. Fiducial line, the line or ruler which paſſes through the middle of an aſtrolable, or the like inſtrument, and on which the ſights are fitted, otherwiſe called alhidade, index, dioptra, and mediclinium. See the article ASTROLABE. 2. The horizontal line. 3. Iſochronal line. 4. Meridian line. 5. Line of the nodes. See the articles HORIZONTAL, ISOCHRONAL, MERIDIAN, and NODES.

LINES, in perſpective, are, 1. Geometrical line, which is a right line drawn in any manner on the geometrical plane. 2. Terreſtrial line, or fundamental line, is a right line wherein the geometrical plane, and that of the picture or draught, interſect one another. 3. Line of the front, is any right line parallel to the terreſtrial line. 4. Vertical line, the common ſection of the vertical and of the draught. 5. Viſual line, the line or ray imagined to paſs from the object to the eye. 6. Line of ſtation, according to ſome writers, is the common ſection of the vertical and geometrical planes. Others, as Lamy, mean by it the perpendicular height of the eye above the geometrical plane. Others a line on that plane, and perpendicular to the line expreſſing the height of the eye. 7. Objective line, the line of an object from whence the appearance is ſought for in the draught or picture.

LINES, in dialling, are, 1. Horizontal line, the common ſection of the horizon and the dial-plane. See DIAL. 2. Horary lines, or hour lines, the common interſections of the hour-circles of the ſphere, with the plane of the dial. 3. Subſtylar line, that line on which the ſtyle or cock of a dial is duly erected, and the repreſentation of ſuch an hour-circle as is perpendicular to the plane of that dial. 4. Equinoctial line, the common interſection of the equinoctial and plane of the dial.

Contingent LINE. See CONTINGENT.

LINE *of Meaſures* is uſed by Oughtred, to denote the diameter of the primitive circle in the projection of the ſphere in plano, or that line in which the diameter of any circle to be projected falls. In the ſtereographic projection of the ſphere in plano, the line of meaſures is that line in which the plane of a great circle perpendicular to the plane of the projection, and that oblique circle which is to be projected, interſects the plane of the projection; or it is the common ſection of a plane paſſing through the eye-point and the center of the primitive at right angles to an oblique circle which is to be projected, and in which the center and pole of ſuch circle will be found.

LINE *of Direction of the Earth's Axis*, in the Pythagorean ſyſtem of aſtronomy, the line connecting the two poles of the ecliptic and of the equator when they are projected on the plane of the former.

LINE *of Direction*, in mechanics, that wherein a body actually moves, or would move, if it were not hindered. It alſo denotes the line that paſſes through the center of gravity of the heavy body to the center of the earth, which muſt alſo paſs through the fulcrum, or ſupport of the heavy body, without which it would fall.

LINE *of Gravitation*, of any heavy body, a line drawn through its center of gravity, and according to which it tends downwards.

LINE *of the ſwifteſt Deſcent*, of a heavy body, is the cycloid. See CYCLOID.

LINE *of a Projectile*. See PROJECTILE.

LINES *on the Plain Scale*, are the line of chords, line of ſines, line of tangents, line of ſecants, line of ſemitangents, line of leagues; the conſtruction and application of which, ſee under the words SCALE, SAILING, &c.

LINES *on Gunter's Scale*, are the line of numbers, line of artificial ſines, line of artificial tangents, line of artificial verſed ſines of rhumbs, line of artificial tangents of the meridian line, and line of equal parts; for the conſtruction and application of which, ſee GUNTER's SCALE.

LINES *of the Sector*, are the line of equal parts, or line of lines, line of tangents, line of ſecants, line of polygons, line of numbers, line of hours, line of latitudes, line of meridians, line of metals, line of ſolids, line of planes. See the article SECTOR.

LINES, in fortification, are thoſe of approach, capital, defence, circumvallation, contravallation, of the baſe, &c. See the articles APPROACH, CAPITAL, &c.

To LINE *a Work*, ſignifies to ſtrengthen a rampart with a firm wall; or to encompaſs a parapet or moat with good turf, &c.

LINE, in the art of war, is underſtood of the diſpoſition of an army, ranged in order of battle, with the front extended as far as may be, that it may not be flanked. See ARMY.

LINE *of Battle*, in the marine, the array in which a fleet or ſquadron of ſhips of war is formed to engage with an enemy.

In this manoeuvre, the ſhips are drawn up about one hundred fathoms diſtant, a-head of each other, the admiral being in the center, whoſe chief judgment is to form it in a proper diſpoſition and ſtrength throughout, from the van to the rear; in doing which, particular care muſt be had to make the center ſtrong; for if that is forced or broke through, the battle is looked upon as loſt. Here it is to be obſerved, that in a ſea-action the center is made the ſtrongeſt; whereas in a land-fight it is the weakeſt; and the wings of an army are the ſtrongeſt, leſt the enemy by forcing a wing, ſhould have the advantage of flanking, and conſequently, putting the line in confuſion; for the ſame reaſon alſo, the van and rear of a fleet is not put into diſorder, becauſe care is taken to make them proportionally ſtrong to reſiſt the enemy; therefore the weakeſt part of the line will be in the quarters, as ſupported each way from the center throughout.

The line being thus formed, there ought to be a corps-de-reſerve, as many as may be thought neceſſary, if they can be diſpenſed with. But firſt, the line muſt ſtretch out the length of the enemy's, if poſſible, or elſe they will have the advantage, and by tacking and doubling upon your line, put the van and rear into confuſion.

It is a maxim in naval diſcipline, that a commanding flag-ſhip ſhould never go out of her way for any ſhip whatever, unleſs that ſhip ſhould be diſabled, or that a ſudden ſhift of wind takes her unexpectedly. The reaſon is ſelf-evident: if the admiral gives way for one, or backs and fills for another's fancy or miſconduct, there would be no end to ſuch negligence or overſight; therefore the commanding flag-ſhip expects that every ſhip in his fleet will obſerve and take her motions from him and his ſeconds, whoſe diſtance from the admiral ſhould be a ſtandard for every other ſhip to follow in that from each other, as near as poſſible, except when her ſignal is made to back or fill, or make more or leſs ſail.

The ſeconds to the commanding flag-ſhip are particularly to regard her, to move as ſhe does, whether the other ſhips do or not, or cannot do; for they are called ſeconds, to guard and attend the admiral's ſhip.

It is the duty of every officer, as ſoon as the ſignal is diſplayed for the line to croud, if poſſible, into his ſtation, and not to lie through indolence or negligence, braced to or a-back, but make ſail to windward, or bear away to leeward, in order to form the line immediately, and then each leading ſhip to mind her tack as the wind is, to lead and give room.

The commanding flag-officer, when his ſhips are arranged into a line, obſerves the ſtrength of the enemy's line throughout, and acts accordingly, making more or leſs ſail, or what motion he might think moſt to his advantage. He is not to take his motion from his leading ſhip, but upon ſome particular occaſion, ſignal, notice, or meſſage ſent to him.

In a line of battle, the weathermoſt fleet, or that which has the weather-gage, in the ſea language, is generally allowed to have the advantage, although there are ſeveral arguments on the other hand, in favour of the lee-ſide. We ſhall endeavour to ſtate the mutual advantages.

1. The weather-gage is ſooneſt clear of ſmoke; and of courſe, that line can better obſerve the ſignals which are ſpread, than the ſhips to leward can, which muſt have the continuance of both its own and of the enemy longer.

2. If the weather-ſhips are more in number than the enemy's fleet, they can detach ſome from their ſquadron, which bearing down upon the rear of the enemy, muſt infallibly throw them into diſorder.

3. The fire-ſhips of the weather-line can, when they are ordered, more eaſily bear down upon the enemy, than thoſe of the lee can ply to windward, which can never be done againſt a line in action; but the weather fire-ſhips can bear down againſt all the reſiſtance that can be made by the enemy.

Advantages of the lee-line.—1. If one, two, or more of the ſhips to windward ſhould be diſabled, they muſt inevitably drive to leeward, and become a prey to the enemy.

2. The ſhips of the lee-line can more readily bear away before the wind, and have their places ſupplied by ſhips from the corps-de-reſerve, in caſe of being diſabled on meeting with any diſaſter.

3. The line to leeward can keep their ports longer open in a ſtrong wind with a high ſea, when thoſe to windward, in all probability, may be obliged to ſhut the ports of their lower tier of guns, to prevent the water from ruſhing in between decks, which may be attended with the moſt fatal conſequences.

4. The lee-line can more eaſily obſerve the men on the decks of the ſhips to windward, as they heel, and when the ſmoke does not intercept their ſight: at which time the marines and top-men may eaſily take aim at, and deſtroy them with muſkets or carabines.

Line A-breast, an arrangement in which the whole ſquadron advances uniformly with all the ſhips parallel to each other; ſo that the length of each ſhip forms a right line with the line a-breaſt. See Division, Squadron, and Naval *Engagement.*

Line in fencing, that part of the body oppoſite to the enemy, wherein the ſhoulders, the right arm, and the ſword, ought always to be found; and wherein are alſo to be placed the two feet at the diſtance of eighteen inches from each other. In which ſenſe a man is ſaid to be in his line, or got out of his line, &c.

Line *of Demarcation*, or *Alexandrian* Line, a meridian paſſing over the mouth of the river Moragnon, and by the capes Houmas and Mallabrigo, ſo called from pope Alexander VI. who, to end the diſpute between the crowns of Caſtile and Portugal, about their boundaries, drew an imaginary line on the globe, which was to terminate the pretenſions of each. By this partition, the Eaſt-Indies fell to the ſhare of the Portugueſe, and the Weſt-Indies to the Caſtillians.

Line *of the Synodical*, in reference to ſome theories of the moon; is a right line ſuppoſed to be drawn through the centers of the earth and ſun: and, if it be produced, quite through the orbits: it is called the line of the true ſyzygies: but a right line imagined to paſs through the earth's center, and the mean place of the ſun, is called the line of the mean ſyzygies.

Line, in genealogy, a ſeries or ſucceſſion of relations in various degrees, all deſcending from the ſame common father.

Direct line, is that which goes from father to ſon; being the order of aſcendants and deſcendants.

Collateral line is the order of thoſe who deſcend from ſome common father, related to the former, but out of the line of aſcendants and deſcendants: in this are placed, uncles, aunts, couſins, nephews, &c. See Direct and Collateral.

Line alſo denotes a French meaſure, containing the twelfth part of an inch, or the hundred and forty-fourth part of a foot.

Lines, in muſic, the name of thoſe ſtrokes drawn horizontally on a piece of paper, on and between which the characters and notes of muſic are diſpoſed: their number is commonly five; when another is added, for one, two, or more notes, it is called a ledger-line.

Lines, in heraldry, the figures uſed in armories, to divide the ſhield into different parts, and to compoſe different figures. Theſe lines, according to their different forms and names, give denomination to the pieces or figures which they form, except the ſtraight or plain lines.

LINEA *Alba*, in anatomy, a white line which runs from the cartilago enſiformis to the os pubis, dividing the abdomen exactly in the middle: and is formed out of the tendons of the oblique and tranſverſe muſcles.

It receives a twig of a nerve from the intercoſtals in each of its digeſtations or indentings.

LINEAMENT, among painters, implies the outlines of a face.

LINEAR PROBLEM, in mathematics, ſuch a problem as may be ſolved geometrically, by the interſection of two right lines: as meaſuring an inacceſſible height by means of two unequal ſticks, &c. It is alſo called a ſimple problem, and is capable but of one ſolution.

LINEN, in commerce, a well-known kind of cloth, chiefly made of flax. See FLAX.

LINIMENT, *Linimentum*, in pharmacy, a compoſition ſomewhat thinner than an unguent, and thicker than an oil, uſed for anointing the body in various intentions.

LINNET, *Linaria*, in ornithology, a bird of the ſize of the goldfinch; the head is ſmall and flatted; the eyes are ſmall, and hazel; the beak is conic, very ſmall, and ſharp at the point; the head, neck, and back are variegated with a bright brown and white, the breaſt and belly are pale, but in the male, eſpecially in the ſummer, there is a redneſs on the top of the head and all over the breaſt. This is a ſinging bird, and ſometimes has young ones four times a year, eſpecially if they are taken from the dam before they are able to fly, which may be done four days after they are hatched.

LINSEED, the ſeed of the plant linum. See the article LINUM.

Linſeed bruiſed and ſteeped in water, gives it very ſoon a thick mucilaginous nature, and communicates much of its emollient virtues to it. It is anodyne, attemperating, and of great ſervice in ſuppreſſions of urine from inflammation and heat; it envelops the acid ſalts of the urine, and prevents their vellicating and wounding the tender parts; and in ſome meaſure ſupplies the mucus of the bladder, when abraded and worn off. It is to be given in decoction, or infuſion, on theſe occaſions: the infuſion is not to be made too thick or mucilaginous, becauſe in that caſe it loads the ſtomach, and breeds flatulencies in the inteſtines. A ſlight infuſion of linſeed, by way of tea, is recommended by many as an excellent pectoral; and the ſeed is a common and very good ingredient in clyſters. Externally, this ſeed, ground to powder, is an excellent emollient; as is alſo the ſtrong mucilage, made by boiling the ſeeds along time: the oil drawn from it by expreſſion is of great ſervice in coughs, pleuriſies, and many other caſes.

LINSPINS, in the military art, ſmall pins of iron, which keep the wheel of a cannon, or waggon, on the axle-tree; for when the end of the axletree is put thro' the nave, the linſpin is put in, to keep the wheel from falling off.

LINSTOCK, in the military art, a wooden ſtaff, about three feet long, upon one end of which is a piece of iron, which divides in two, turning from one another, having each a place to receive the match, and a ſcrew to kept it faſt: the other end is pointed, and ſhod with iron, to ſtick in the ground. It is uſed, by gunners, to fire the guns.

LINT, *Linum*, the flax of which linen is made. See FLAX and LINEN.

In ſurgery, the term lint denotes the ſcrapings of linen which is uſed in dreſſing wounds, and is made up in varions forms, as tents, doſſils, pledgets, &c. See the articles TENT, DOSSIL, &c.

LINTEL, in architecture, a piece of timber that lies horizontally over door-poſts and window-jambs, as well to bear the thickneſs of the wall over it, as to bind the ſides of the wall together.

LINUM, flax, in botany, a genus of plants, the flower of which is infundibuliform, conſiſting of five oblong petals; its fruit is a globoſe capſule, divided into ten cells, in each of which is a ſingle acuminated ſeed. See FLAX and LINSEED.

LION, *Leo*, in zoology, the ſtrongeſt and fierceſt of all quadrupeds.

The head of the lion appears very large in proportion to its body, and is the moſt fleſhy of the heads of all the known animals. Its jaw-bones alſo are remarkably large. The breaſt alſo appears very large, but this is only owing to the great quantity of long hair that covers it, for the ſternum is ſmaller than that of moſt animals of the ſame ſize. The tail, which is very long, appears alſo of the ſame thickneſs all the way, but this is wholly owing to the growth of the hair. The tail itſelf is largeſt at the baſe, and thence goes taper to the point; but the hair being very ſhort near its baſe, and continuing to grow longer all the way, as that decreaſes in thickneſs, is ſo exactly proportioned in this growth, that it always gives the whole tail this regular appearance.

The lion has fourteen teeth in each jaw, four inciſores, four canine, and ſix molares. The inciſores are ſmall; the canine are unequal in ſize, two being very large and two very ſmall; the large ones are an inch and half long, and are the only ones the ancients allowed to be canine teeth. The molares alſo are irregular in ſize, the anterior ones being very ſmall, the others large, and terminated by three or four points, forming a ſort of flower-de-luce.

Ariſtotle, Ælian, and others ſay, that the neck of the lion is all compoſed of one unjointed bone. It appears indeed very rigid in this creature, but it does not proceed from ſo ſtrange a cauſe, but is found owing to this, that the ſpinoſe apophyſes of the vertebræ of the neck are long, and faſtened together by extremely ſtrong and rigid ligaments.

The tongue of the lion is very rough and rigid, being covered with a great number of prominences of a hard matter, reſembling that of a cat's claws, and nearly of the ſame ſize, the baſe of each being a round fleſhy prominence on the ſurface of the tongue.

The eyes of the lion are clear and bright, even after the creature is dead. The common obſervation that this creature ſleeps with its eyes open, is founded on this, that it has a very thick membrane lodged in the greater canthus of the eyes, which it can extend over the whole eye upon occaſion, as birds do their membrana nictitats, and thus will have no occaſion to ſhut its eye-lids, in order to exclude the light. It is very remarkable, that the common cat has all the ſingular ſtructure of the ſeveral parts as the lion has; its claws, feet, tongue and eyes, being of the ſame kind, and its internal parts bearing as ſtrong a reſemblance.

The heart of the lion is greatly larger than that of any other creature of the ſame ſize, being ſix inches long, and four in diameter, in the largeſt part, and terminating in a very ſharp point. The brain is as remarkably ſmall; and upon the compariſon of this with the great quantity of brain in a calf, and purſuing the obſervation through ſeveral other creatures, as to the proportion of brain they have, it does not appear that a ſmall quantity of brain is a mark of folly, but uſually of great ſubtlety, and of a cruel diſpoſition. *Mem. pour l'Hiſtoire des Anim.*

LIONCELLES, in heraldry, a term uſed for ſeveral lions borne in the ſame coat of arms.

LIP, *Labinum*, or *Labium*, in anatomy, the exterior fleſhy covering of the mouth. See MOUTH.

The cheeks and lips form the ſides and entry of the cavity of the mouth. They are formed in general by the connexion of ſeveral fleſhy portions, of different breadths, fixed round the two jaws, covered on the outſide with the ſkin and fat, and lined on the inſide by a glandulous membrane. Beſides this, the lips have a ſoft ſpongy ſubſtance, which ſwells and ſubſides on certain occaſions, independently of the action of the muſcles; and is mixed with fat.

The arteries which go to the lips are ramifications of the external carotid, and principally of the external and internal maxillary branches. See ARTERY.

The veins are ramifications of the external anterior jugular. See VEIN.

The nerves of theſe parts come from the maxillaris ſuperior and inferior, which are branches of the fifth pair; and alſo from the portio dura of the auditory nerve, or ſympatheticus minimus, the ramifications of which are ſpread in great numbers on all theſe parts and communicate very ſingularly with the nerves of the fifth pair in ſeveral places.

Hare-LIPS, in ſurgery, a diſorder in ſome perſons wherein the upper-lip is ſo divided, as to reſemble a hare's lip. This diviſion is ſometimes ſmall, at other times it is double, like the letter M, and then termed the double hair-lip. Beſides the deformity cauſed by this diſorder, it hinders infants from ſucking, and adults from ſpeaking diſtinctly. Sometimes this accident happens to the lower lip from the ill treatment of a wound, and this is called the ſpurious hare-lip; the true kind is born with the infant. The leſs and more equal the fiſſure of the hare-lip is, it is generally ſo much the more eaſily cured. In ſome infants, the diviſion of the lip is ſo large and irregular, that there can be but little hopes of a cure, which may, however, be eaſily performed on the very ſame lip, when adult. Sometimes too we meet with a tooth projecting forward into the fiſſure; in this caſe it cannot be cured without firſt taking out the tooth. In a recent hare-lip, or one made by a wound, the cure is to be performed by the knotted ſuture. See the articles SUTURE and WOUND.

In curing the hair lip, where part of the lip is wanting, no attempt can be made to ſupply what is deficient, but only to unite thoſe parts which are divided by taking off the ſkin from the edges of the fiſſure, and then cauſing them to unite and grow together, by paſſing through them two or three needles, made of gold or ſilver, pointed with ſteel from the right to the left, beginning with the upper part of the fiſſure, and inſerting them at about a ſtraw's breadth from each other: the ſurgeon having thus entered the needles, and cleanſed the bleeding lips with a ſpunge, he takes a piece of ſtrong waxed thread or ſilk, and faſtening it about one end of the needle, he winds it over the other end, and back again. Having done this he afterwards ſecures it by a knot; by this means the edges of the lips are brought cloſe together, and the upper-part or ſurface kept ſmooth and even. To heal the wound internally, it is dreſſed with ſoft lint dipped in honey of roſes, and put between the gums and lip; but this practice can only be followed with adults: the external part of the wound is at the ſame time dreſſed with balſam of Peru, or ſome other vulnerary unguent, covered with lint and compreſs, and over that a ſticking plaſter with four heads, two of which are faſtened on the left ſide of the lip, and two upon the right, and the whole ſecured by a ſling or fillet, whoſe extremities may be faſtened about the head, either by a knot or pins. But it muſt here be obſerved, that when the fiſſure appears large and deep, ſo that the two parts of the lip cannot be eaſily joined, it will be neceſſary, before the above operation, to divide the frænulum of the upper-lip from the gum, with a pair of ſciſſars, but without wounding the gum, or uncovering the jaw. Though the hæmorrhage is often very plentiful in performing theſe operations on young infants, yet it is not dangerous, ſince it prevents an inflammation, and generally ceaſes after tying the bandages.

The dreſſings ought not to be moved before the third day, unleſs ſome accident makes it neceſſary; and then it muſt be done with great caution, to avoid ſeparating the parts in contact. If the lips of the wound appear conjoined, three or four days after the operation, you may then venture to draw out the middle needle, when there are three, or the upper one, when there are only two; and two or three days after draw out the other: the cure muſt be completed by dreſſing every day, as at firſt.

LIPOTHYMIA, in medicine, the name of a diſeaſe uſually confounded with the ſyncope, but really different from it in many particulars.

The lipothymia is a very conſiderable abolition of the vital and animal faculties, at leaſt to appearance: and the ſyncope is a plenary or total abolition of them, as far as appears to us at the time. It is eaſy to ſee, however, that theſe are only two different ſtages of the ſame diſtemperature. The lipothymy is ſometimes an idiopathic, ſometimes a ſymptomatic diſeaſe, and moſt frequently attends the ſcurvy, malignant fevers, and other diſorders; the ſyncope differs from death only in degree: and the body being flaccid in this, and growing rigid under the laſt convulſions in death, is the only diſtinction of them in extreme caſes.

LIQUIDAMBER, in botany, a genus of the monoecia claſs of plants, the male flowers of which are numerous, and grow in a long looſe conical amentum; they are deſtitute of a corolla, being each compoſed of a four leaved involucrum, with a great number of very ſhort ſtamina. The female are alſo apetalous, and are placed at the baſe of the male ſpike, collected in a globe; theſe have a double involucrum, alſo a campanulated perianthium, with many protuberances. The fruit is an ovate unilocular capſule, with two valves at top, and collected in a ligneous globe, and contains many oblong pointed ſeeds.

The liquidamber-tree is a native of ſeveral parts of North America, where it riſes to the height of forty feet; the leaves are ſhaped like thoſe of the leſſer maple, of a dark green colour, and their upper ſurfaces ſhining; the flowers come out in the ſpring, growing in ſpikes, and are of a ſaffron colour.

The planks of this tree being beautifully veined, are often uſed in America for wainſcoting rooms, but it requires a long time to ſeaſon the boards, otherwiſe they are apt to ſhrink.

LIQUOR Mineralis Anodynus, is a name given by Hoffman to a liquor of his invention, famous at this time in Germany, and ſuppoſed by Burggrave to be made in this manner: take oil of vitriol, and Indian nitre, of each four ounces; diſtil the ſpirit gradually from this, by a retort: pour two ounces of the ſpirit cautiouſly and ſucceſſively, into fifteen ounces of ſpirit of wine, highly rectified; diſtil this, and there comes over a very fragrant ſpirit: this is to be again diſtilled, to render it perfectly pure, adding firſt to it a ſmall quantity of oil of cloves, and a quantity of water, equal to that of the ſpirit; after this, as ſoon as the watery vapours begin to riſe, the whole proceſs is to be ſtopped, and the ſpirit kept alone in a bottle, well corked. This has great virtues as an anodyne, diophoretic, antiſeptic, and carminative. It is not certain that this is the ſame with Hoffman's, that author never having publiſhed his manner of making it; but it appears the ſame to the ſmell and taſte, and has the ſame virtues.

LIQUORICE, *liquoritia glycyrrhiza*, and *radix dulcis*, a ſweet root of conſiderable uſe in medicine.

This plant, deſcribed by all the botanical authors under the name of glycyrrhiza vulgaris, grows to four or five feet high, its ſtalks are hard and woody, its leaves are ſmall and roundiſh; and they ſtand many together on the two ſides of a rib, making what authors call a winged leaf. They are viſcous to the touch; the flowers are of the papilionaceous kind, ſmall and bluiſh.

The plant is of the diadelphia decandria of Linnæus, and of the herbæ flore papilionaceo ſeu leguminoſæ of Mr. Ray. Liquorice grows wild in many parts of France, Italy, Spain, and Germany. It is cultivated in great abundance in Yorkſhire, and in many other parts of England; and by the good order we keep the ſoil in, produce better roots, longer, evener, and more ſucculent than are to be had from any other part of the world. The reſt of Europe is in great meaſure furniſhed by what grows about Bayonne and Saragoſſa in Spain.

The ground deſigned for liquorice muſt be well dug, and dunged the year before, that the dung may be thoroughly rotted in it; and juſt before it is planted, the earth is to be dug three ſpades deep, and laid very light. The plants to be ſet ſhould be taken from the ſides or heads of the old roots, and each muſt have a very good bud, or eye, or otherwiſe they are ſubject to miſcarry; they ſhould alſo be about ten inches long, and perfectly ſound. The beſt ſeaſon of planting them is the end of February, or the beginning of March, and this muſt be done in the following manner: the rows muſt be marked by a line drawn a-croſs the bed, at two feet diſtance; and the plants muſt be ſet in theſe by making a hole of their full depth, and ſomething more, that the eye of the root may be an inch below the ſurface: they muſt alſo be ſet two feet diſtance from each other in the rows. When this is done, the ground may be ſowed over with onions, which, not rooting deep, will do the liquorice roots no injury for the firſt year. In October, when the ſtalks of the liquorice are dead, a little very rotten dung ſhould be ſpread over the ſurface of the ground. Three years after the time of planting, the liquorice will be fit to take up for uſe; and this ſhould be done juſt when the ſtalks are dead off; for, if taken up ſooner, the roots are very apt to ſhrink greatly in their weight. The roots about London look browner than thoſe which have been propagated in a leſs rich ſoil, but then they are much larger, and grow quicker to their ſize. *Miller's Gard. Dict.*

Liquorice is an excellent medicine in coughs, and all diſorders of the breaſt and lungs. It obtunds the ſharpneſs of acrid and ſalt humours. It is alſo recommended againſt diſorders of the kidneys and bladder, and is ſaid to take off the ſenſe of pain in many terrible complaints. It is an ingredient in almoſt all decoctions and ptiſans, in which it is eſteemed for obtunding acrimony, and for giving the whole a very pleaſant taſte, and drowning the worſt flavour of the other ingredients.

Liquorice *Juice*, the inſpiſſated juice of the common liquorice root, and is brought to us in rolls or cakes, covered uſually with bay leaves from Spain and Holland, from the firſt of which places it obtained the name of Spaniſh juice. It is to be choſen firm, but not tough, hard, and when broken, of a fine ſhining ſurface; ſuch as perfectly melts in the mouth, and does not taſte of burning, nor leaves any harſh or gritty particles between the teeth.

The manner of preparing it in Spain is this: they take up the roots in the month of July; they clean them perfectly as ſoon as taken out of the earth, and then hang them up in the air till nearly dry; after this they cut them into thin ſlices, and boil them in water till the decoction is extremely ſtrong; they then preſs it hard out, to obtain all the juice they can from the root. They ſet this decoction by, to ſettle a little, and when it has depoſited its courſeſt parts, they pour it off into veſſels, in which they evaporate it over a fire, ſtrong at firſt, but milder afterwards, till it becomes of the conſiſtence of a thick extract; they then let the fire go out, and when the extract is ſo cool that they can handle it, they take out large parcels of it at a time; and working them well in the hands, they roll them out into long cylindric maſſes, which they cut out into ſuch lengths as they pleaſe; and rolling them over a parcel of half dried bay leaves, they pick up enough of them for a covering, which are in that condition laid in the ſun till perfectly dried; there is great nicety required at the end of the evaporation, to get the extract to a proper conſiſtence, without letting it burn. It is this the Spaniards are famous for: a great deal of liquorice juice is made in other places, but it is in a great meaſure either under-boiled, and conſequently ſoft, or is burnt.

Liquorice juice has the ſame virtues with the root it is produced from. It is a very famous remedy among the common people for coughs, and all diſorders of the breaſt and lungs. It is commonly taken alone, holding a ſmall piece of it in the mouth till it gradually melts there; but the more agreeable way of taking it is in the form of lozenges, of which there are many kinds, which it is the baſis of; in theſe it is mixed with other pectoral ingredients, and has the advantage of melting more eaſily in the mouth than in its own form. It is alſo an ingredient in the theriaca and ſome other compoſitions of the ſhops.

LIST, in commerce, the border of cloth, or of a ſtuff; ſerving not only to ſhew their quality, but to preſerve them from being torn in the operations of fulling, dyeing, and the like. See Cloth, &c.

Liſt is uſed on various occaſions; but chiefly by gardeners for ſecuring their wall trees.

List, in architecture, a little ſquare moulding, otherwiſe called a fillet, liſtel, &c. See the articles Fillet and Moulding.

LISTING, the ſame as heeling, or inclining to one ſide. See Heel and Careen.

LITANY, a ſolemn form of ſupplication to God, in which the prieſt utters ſome things fit to be prayed for, and the people join in their interceſſion.

LITERATI, in general, denotes men of learning; but is more particularly uſed by the Chineſe, for ſuch perſons as are able to read and write their language, which is remarkably difficult.

LITHARGE, a metalline ſubſtance, formed of the ſpume of lead.

The word is Greek, λιθαργυρος, which is formed of λιθος, a ſtone, and αργυρος, ſilver, becauſe it is found in furnaces where ſilver is refined.

This preparation, or, as it may be more properly called, recrement of lead, is of two kinds, differing in colour, though in no other quality: the ancients, as well as moderns, obſerved this difference, and called the one litharge of gold, and the other litharge of ſilver. This recrement of lead is not prepared by a formal proceſs on purpoſe; it is collected from the furnaces where ſilver is ſeparated from lead, or from thoſe where gold and ſilver are purified by means of that metal; but in the furnaces uſed for either of theſe purpoſes, it is generally run into lead again, to ſerve for the ſame or other uſes. The litharge ſold in the ſhops is produced in the copper works, where lead has been uſed to purify that metal, or to ſeparate ſilver from it. Of all the various metalline and mineral ſubſtances, which are ſeparated from gold or ſilver, by means of lead, there is none but copper which remains embodied in and intimately joined with that metal after ſcorification; the others being either not at all received into the body of it, or, if they are, being either deſtroyed before ſcorification; or, finally, if they remain mixed with it longer, they ſplit and deſtroy the veſſels. The recrement produced from this combination of lead with copper, is our common litharge. It is of a yellower or redder colour, as the fire has been more or leſs ſtrong; and is always compoſed of a multitude of thin flakes, reſembling the ſpangles of talc, in thoſe foſſils called micæ or glimmors.

The greateſt quantities of litharge are brought from Sweden, Germany, and Denmark. Poland furniſhes ſome, as does alſo England, but the Dantzic kind is eſteemed the moſt valuable. The beſt litharge is that which is moſt calcined, and of the livelieſt colour. Litharge, on the whole, is properly lead vitrified, either alone or with a mixture of copper.

Litharge is ſoluble in oil and all other unctuous ſubſtances, and thus diſſolved, it makes the baſis of a great part of the ointments and plaſters of the ſhops. It is drying, abſtergent, and ſlightly aſtrictive; and hence it is of great uſe in cleanſing ulcers, and diſpoſing them to incarnate.

LITHOCOLLA, a cement uſed by lapidaries for faſtening precious ſtones together. See the article CEMENT.

LITHONTRIPTICS, medicines which either break, or are ſuppoſed to have the virtue of breaking ſtones in the urinary paſſes.

The word is derived from the Greek λιθος, a ſtone, and θρυπτω, to break.

LITHOPHYTA, in botany, a ſubdiviſion of plants, ſo called from their approaching to a ſtony hardneſs, comprehending the iſis, ſpongia, millepora, tubipora, &c.

LITHOSPERMUM, gromwell, in botany, a genus of plants, the corolla of which conſiſts of a ſingle petal of the length of the cup: the tube is cylindric, the limb ſemiquinquifid, obtuſe, and erect: there is no pericarpium, but the cup becomes patulous and long, containing four broad, oval, acuminated, and hard ſeeds.

The ſeeds of this plant, being the only parts uſed in medicine, are accounted diuretic. Emulſions are made of them, with dog's graſs water.

LITHOTOMY, in ſurgery, cutting for the ſtone. See the article STONE.

The ſeveral methods of performing this dangerous operation, according to Heiſter, are four: the firſt, and moſt ancient, is the apparatus minor, called likewiſe the Celſian or Guidonian method: the ſecond, the apparatus magnus, or Marianus's method; the latter better termed the new, and the former the old method: the third is the apparatus ultus, or hypogaſtric ſection, wherein the inciſion is made at the lower part of the obdomen in the anterior ſide of the bladder, immediately above the os pubis; whereas in the reſt it is made in the perinæum, between the anus and the ſcrotum: the fourth, and moſt modern method, was invented towards the end of the laſt century, and is termed the lateral operation.

1. The firſt method is now entirely laid aſide, though Heiſter thinks it practicable on boys under fourteen: the wound of the bladder in this operation, ſays Sharp, is made in the ſame place as is now practiſed in the lateral method; but its being impracticable on ſome ſubjects, and uncertain in all others, has made it to be univerſally exploded.

2. In performing lithotomy by the apparatus major, Mr. Sharp's directions for the ſituation of the patient are thus. Having laid the patient on a ſquare horizontal table, three feet four inches high, with a pillow under his head, let his legs and thighs be bent, and his heels made to approach his buttocks by tying his hands to the ſoles of his feet with a couple of ſtrong ligatures; and to ſecure him more effectually from ſtruggling, paſs a double ligature under one of his hams, and carry the four ſtrings round his neck to the other ham: then paſſing the loop underneath, make a knot by threading one of the ſingle ends through the loop; and thus the thighs are to be widened from each other, and firmly ſupported by proper perſons.

The patient thus ſituated, Heiſter directs the operation as follows: the operator, dipping the beak of a ſizeable and grooved ſteel catheter in oil, conveys it through the urethra into the bladder, and being aſſured there is a ſtone, turns the crooked part of the catheter in the bladder and urethra towards the left ſide of the perinæum, but the handle and penis which contains it, towards the right inguen, then delivers it to the aſſiſtant, who holds up the ſcrotum in the other hand; for the crooked convex part of the catheter thus elevated in the perinæum, renders that part of the urethra which is to be divided, ſufficiently perceptible both to the ſight and touch. He next lays hold of the integuments of the perinæum with the fingers of his left hand, holding in his right the inciſion-knife, wrapped in linen, as he would do a pen for writing: with this he makes a longitudinal inciſion downwards, about the middle of the left ſide of the perinæum near the ſuture, through the fat; then he again feels for the catheter, and afterwards divides the urethra in a direct line downwards, ſo that the end of the knife may paſs into the groove of the catheter. After a proper inciſion, the ſurgeon parts with his knife, inſerting in the groove of the catheter, if an aſſiſtant holds it, the nail of his finger or thumb: then he takes a male conductor, dips it in warm oil, and having paſſed it through the groove of the catheter and neck of the bladder into the bladder itſelf, extracts the catheter.

The male conductor being thus paſſed, a female conductor is introduced upon it, in ſuch a manner as the latter receives the prominent back of the former in its groove, and conveys it ſafely into the bladder through its neck. After this, the two conductors are gently ſeparated by their handles, and then a ſtraight forceps, dipt in oil and ſhut very cloſe, is carefully conveyed into the bladder between the conductors. The forceps, after it is introduced, and the conductors withdrawn, muſt be opened ſeveral times to dilate the wound, and then ſhut to ſearch for the ſtone: when the ſtone is found, they muſt be opened with both hands, in ſuch a manner that one jaw, if poſſible, may lay hold under the ſtone, and the other above it. When the ſtone is thus intercepted, the forceps, by a gentle motion from ſide to ſide, muſt be brought towards the rectum, and the ſtone extracted downwards, becauſe the parts dilate and yield more eaſily that way, while upwards they meet with a reſiſtence from the os pubis: but if it lies concealed in any part of the bladder, and cannot be laid hold of by the forceps, the operator muſt paſs the two firſt fingers of his left hand into the anus, elevate the ſtone, and force it into them. If it is ſituated in the upper part of the bladder, behind the oſſa pubis, the inferior part of the abdomen muſt be preſſed downwards by the hand, that it may commodiouſly be taken hold of, and drawn out by the ſtraight or crooked forceps; and if it is lodged on either ſide, the crooked inſtrument is moſt convenient.

When the ſtone is too large to be extracted whole, it muſt be broken by a forceps with teeth, and the fragments to be drawn out one after another. Laſtly, if the ſtone is too large and too hard to be either extracted or broken, a prudent ſurgeon will deſiſt, and heal the wound, or leave a fiſtula for the diſcharge of the urine. The ſtone being thus extracted, and the bladder cleared, the wound is cleanſed with a ſponge, the ligatures untied, the patient put to bed, and the wound now dreſſed with the doſſils of ſcraped lint: if the hæmorrhage be too profuſe, it may be ſtopped by pledgets of lint dipt in a proper ſtyptic, and the arteries compreſſed with the fingers till it ſtops.

Theſe muſt be covered with a linen bolſter, and a large ſquare compreſs without a plaſter, ſecuring the whole with the T bandage, or that with four heads; and if they are ineffectual, the artery muſt be tied up with a crooked needle and thread. See the article HÆMORRHAGE.

After dreſſing, the patient muſt be ſupplied with plenty of ptiſan, barley-water, or a ſtrengthening and compoſing emulſion; his diet ſhould be the ſame as for people in fevers, or after great wounds. See the articles FEVER and WOUND.

3. The apparatus altus, or high operation, is performed as follows:—The patient being duly prepared, and laid in a proper ſituation, a hollow ſilver catheter, with a flexible leathern tube at the end of it, is to be introduced into the bladder: to the tube muſt be fitted a large ſyringe, for the injecting of ſuch warm water, barley-water, or milk, as the patient can bear. When this is done, the catheter is extracted: then, while an aſſiſtant introduces his two fore-fingers into the anus to elevate the ſtone and bladder, the operator makes an inciſion in a right line through the ſkin, fat, and abdominal muſcles, immediately above the oſſa pubis. The external wound ſhould be three fingers breath long in children, and four in adults; then introducing the left index, the ſurgeon feels for the liquor that diſtends the bladder, and then makes an inciſion into the bladder immediately above the juncture of the oſſa pubis: after which he paſſes a ſmall knife into the body of the bladder, ſo as to make a ſmall wound with the point only; through this aperture he paſſes a crooked or ſtraight knife, armed with a button, whereby he enlarges the wound upwards the breadth of one or two fingers. He then introduces his left index to draw the upper part of the bladder towards the navel, and then enlarges the wound downwards. Immediately after, he introduces the fore-finger of the other hand, and examines the ſize and ſituation of the ſtone, and accordingly he enlarges the wound either upwards or downwards, in order to extract it; and when the ſtone is extracted, and nothing left, the wound is dreſſed, and patient treated much in the ſame manner as in the former caſe.

4. The fourth method, which is called the lateral operation, was performed by Cheſelden thus: every thing being properly prepared, he introduces a catheter, and afterwards makes an inciſion of a proper length, beginning where they end in the apparatus major, and continuing it downwards between the accelerator urinæ, and erector penis, on the left ſide of the inteſtinum rectum; and directing his knife to the poſterior part of the catheter, through the inferior and lateral part of the bladder, behind the proſtrate gland, and above the ſeminal veſicles; he then continues it forwards through the ſphincter of the bladder, and left ſide of the proſtrate glands into the membranous part of the urethra, even to its bulb, which preſerves the rectum better than the lateral method.

Among Cheſelden's emendations, Douglaſs enumerates theſe: 1. If he finds the patient's pulſe low after the operation, he applies bliſters to the arms, which effectually raiſe his ſpirits. 2. If the wound grows callous, he lays on a piece of bliſter plaſter to erode it, by which new fleſh pullulates, and the wound unites. 3. If the wound be putrid, he mixes a little verdigris with ſome digeſtive ointment.

Women are leſs ſubject to the ſtone in the bladder than men, and their urinary paſſages are more ſhort and lax, ſo that in general, the ſtone being but ſmall, diſcharges itſelf with the urine, and when it happens to increaſe in the bladder, we have inſtances of its coming away ſpontaneouſly. Douglas propoſes to extract a ſmall ſtone in a woman, by dilating the urethra with a tent of gentian root, or prepared ſponge; but when the ſtone is large, he approves of the high operation, diſtending the bladder with warm water, and compreſſing the urethra by an aſſiſtant's finger in the vagina, and then making an inciſion into the bladder immediately above the os bubis. This, Heiſter ſays, is a very proper method, when the ſtone is very large, and the patient young and healthy; but Morand, when the ſtone is ſmall, prefers the apparatus major.

Upon the whole, lithotomy appears to be a dangerous and precarious operation, nor can one method alone be depended on; but the ſurgeon muſt be determined in the choice, by the particular circumſtances of the caſe.

LITURGY, λειτȣργια, a name given to thoſe ſet forms of prayer which have been generally uſed in the Chriſtian church. Of theſe there are not a few aſcribed to the apoſtles and fathers, but they are almoſt univerſally allowed to be ſpurious.

The liturgy of the church of England was compoſed in the year 1547, ſince which time it has undergone ſeveral alterations, the laſt of which was in the year 1661, and of this liturgy Dr. Comber gives the following character:—"No church was ever bleſſed with ſo comprehenſive, ſo exact, and ſo inoffenſive a liturgy as ours; which is ſo judiciouſly contrived, that the whole may exerciſe at once their knowledge and devotion; and yet ſo plain, that the moſt ignorant may pray with underſtanding; ſo full, that nothing is omitted, which ought to be aſked in public; and ſo particular, that it compriſeth moſt things which we would aſk in private; and yet ſo ſhort, as not to tire any that have true devotion. Its doctrine is pure and primitive; its ceremonies ſo few and innocent, that moſt of the Chriſtian world agree in them; its method is exact and natural, its language ſignificant and perſpicuous, moſt of the words and phraſes being taken out of the Holy Scripture, and the reſt are the expreſſions of the firſt and pureſt ages."

And in the opinion of the moſt impartial and excellent Grotius (who was no member of, nor had any obligation to, this church) "the Engliſh liturgy comes ſo near the primitive pattern, that none of the reformed churches can compare with it." Again, he ſays, "In the prayers, a ſcholar can diſcern cloſe logic, pleaſing rhetoric, pure divinity, and the very marrow of the ancient doctrine and diſcipline; and yet all made ſo familiar, that the unlearned may ſafely ſay, Amen."

LITUUS, in Roman antiquity, a ſhort ſtraight rod, only bending a little at one end, uſed by the augurs. See AUGUR.

LIVER, *Hepar*, in anatomy, a large and pretty ſolid maſs of a dark red colour, a little inclined to yellow, ſituated immediately under the arch of the diaphragm, partly in the right hypochondrium, which it fills almoſt entirely, and partly in the epigaſtrium, between the appendix enſiformis and ſpina dorſi, and terminating commonly in the left hypochondrium, into which it ſometimes runs a conſiderable way.

LIVER-WORT, *Lichen*, in botany. See the article LICHEN.

Noble LIVER-WORT. See HEPATICA.

LIVERY *of Seiſin*, in law, ſignifies delivering the poſſeſſion of lands, &c. to him who has a right to them.

LIVERYMEN, of London, are a number of men choſen from among the freemen of each company. Out of this body the common-council, ſheriff, and other ſuperior officers, for the government of the city, are elected, and they alone have the privilege of giving their votes for members of parliament; from which the reſt of the citizens are excluded.

LIVES, or *Inſurance of* LIVES. See the articles INSURANCE and INTEREST.

LIVRE, a French money of account, containing twenty ſols.

LIXIVIOUS, *Lixiviate*, in chemiſtry, ſuch ſalts as are extracted from the aſhes of burnt vegetables by means of lotion.

LIXIVIUM, a ley or water impregnated with the ſalts of burnt vegetables.

What is left after the evaporation of ſuch a liquor is called a lixivious ſalt.

Lixiviums are of great uſe in medicine, bleaching, ſugar-works, &c.

LIZARD, *Lacerta*, in zoology, a genus of amphibious animals, the body of which is oblong and rounded, the legs four, and the hinder part terminated by a tapering tail.

LOACH, the Engliſh name of a fiſh, called by Artedi, the ſmooth ſpotted cobitis, with a cylindrical body.

LOAD, among miners, denotes a vein of ore. See MINE.

It is alſo uſed for nine diſhes of ore. See the article DISH.

LOADSTONE, the ſame with magnet. See MAGNET.

LOAMS, in natural hiſtory, are defined to be earths, compoſed of diſſimilar particles, hard, ſtiff, denſe, and hard and rough to the touch; not eaſily ductile while moiſt, readily diffuſible in water, and compoſed of ſand and a tough viſcid clay. Of theſe loams, ſome are whitiſh, and others brown or yellow.

Some call loam, the moſt common ſuperficial earth that differs from ſand or clay; but the moſt general appellation of loam is applied to a ſoft fat earth, partaking of clay, but eaſy to be wrought.

It is found by experience, that plants of all kinds will grow in it; and wherever it is found, it appears to be a more beneficial ſoil to plants than any other.

LOBATE, or Lobed Leaves, are ſuch as are divided to the middle into parts that ſtand wide from each other, and have their margins convex; and from the number of theſe they are called bilobate, trilobate, quadrilobate, or quinquelobate; conſiſting of two, three, four, or five lobes.

LOBE, in anatomy, denotes each of the two parts of which the lungs conſiſt. See Lungs.

It is alſo applied to the diviſions of the liver. The word is derived from the Greek λοβος, the extremity of a thing.

LOBELIA, in botany, a genus of plants, the flower of which is monopetalous and ſlightly ringent: the fruit is an oval berry with two cells, each containing a ſingle ſeed.

LOCAL, in law, ſomething fixed to the freehold, or tied to a certain place: thus real actions are local, ſince they muſt be brought in the country where they lie; and local cuſtoms are thoſe peculiar to certain countries and places.

Local Problem, among mathematicians, ſuch an one as is capable of an infinite number of different ſolutions, by reaſon that the point which is to reſolve the problem may be indifferently taken within a certain extent, as ſuppoſe any where, within ſuch a line, within ſuch a plane, figure, &c. which is called a geometric locus, and the problem is ſaid to be a local or indetermined one. See Locus.

LOCHIA, in phyſic, the purgations of the uterus after child-birth. Theſe conſiſt, generally, for the two firſt days of a kind of bloody ſeroſity, and gradually become more white, viſcous, and leſs in quantity; which, during the whole time, cannot be determined, ſome women having more, others leſs: nor can the duration of the flux be limitted to any particular time.

The lochia ſometimes flow in too large quantities, either on account of ſomething retained in the uterus, which prevents it from contracting duly; or a too great fluidity or agitation of the blood. If it proceed from a retention of ſomething in the uterus, this muſt, if poſſible, be taken away by the hand. But if it proceed from a too great fluidity or agitation of the blood, temperating decoctions of barley, jellies, emulſions, opiates, and aſtringents, are to be adminiſtered.

But when a deficiency in the lochia, or their utter ſuppreſſion, happens, all poſſible means ſhould be uſed to procure this ſalutary diſcharge. For this purpoſe, mild anti-acids, diluters, and aperients, are to be exhibited. But great ſtreſs is to be laid on aperient and relaxing topics, clyſters, fomentations, plaſters, liniments, cupping on the inferior parts, peſſaries and ſuppoſitories.

Boerhaave adviſes not to let blood in the abovementioned diſorders, without the utmoſt neceſſity.

LOCK, a well known inſtrument for ſecuring doors, cheſts, &c. and only to be opened by a key. See the article Key.

LOCUS Geometricus, in geometry, denotes a line, by any point of which, a local or indeterminate problem is ſolved.

If a right-line ſuffice for the conſtruction of the equation, it is called locus ad rectam; if a circle, locus ad circulum; and theſe were called plain loci: if a parabola, hyperbola, locus ad parabolam, hyperbolam, &c. And thoſe were called ſolid loci.

Wolfius and the moderns more commodiouſly divide loci into orders, according to the number of dimenſions to which the indeterminate quantities riſe.

When in an equation there are two indetermined quantities x and y, then for each particular value of x there may be as many values of y as it has dimenſions in that equation. So that if A P, a part of the indefinite line A E, repreſent x, and the perpendiculars P M (plate LXVI. *fig.* 3.) repreſent the correſponding values of y, then there will be as many points M, the extremities of theſe perpendiculars or ordinates, as there are dimenſions of y in the equation. And the values of P M will be the roots of the equation ariſing by ſubſtituting for x its particular value A P in any caſe.

From whence it appears, how, when an equation is given, you may determine as many of the points M as you pleaſe, and draw the line that ſhall paſs through all theſe points; which is called the locus of the equation.

When any equation involving two unknown quantities, x and y, is propoſed, then ſubſtituting for x any particular value A P, if the equation that ariſes has all its roots poſitive, the points M will lie on one ſide of A E; but if any of them are found negative, then theſe are to be ſet off on the other ſide of A E towards m.

If for x, which is ſuppoſed undetermined, you ſubſtitute a negative quantity, as A p, then you will find the points M, m, are taken in, that it may ſhew all the values of y correſponding to all the poſſible values of x.

If, in any caſe, one of the values of y vaniſh, then the point M coincides with P, and the locus meets with A E in that point.

If one of the values of y becomes infinite, then it ſhews that the curve has an infinite arch: and in that caſe the line P M becomes an aſymptote to the curve, or touches it at an infinite diſtance, if A P is itſelf finite.

If, when x is ſuppoſed infinitely great, a value of y vaniſh, then the curve approaches to A E produced as an aſymptote. If any values of y become impoſſible, then ſo many points M vaniſh.

From what has been ſaid it appears, that when an equation is propoſed involving two undetermined quantities, x and y, there may be as many interſections of the curve, that is the locus of the equation, and of the line P M, as there are dimenſions of y in the equation; and as many interſections of the curve and the line A E as there are dimenſions of x in the equation.

LOCUST, *Locuſta*, a genus of inſects, comprehending the locuſt, ſimply ſo called, the ſeveral ſpecies of other locuſts and graſhoppers, with the crickets of the houſe and field.

Water-Locust, *Locuſta Aquatica*, the name given by authors to a ſpecies of water inſect, ſomewhat reſembling the locuſt kind in ſhape. It is about three inches long, its tail an inch and a quarter, and its legs are of different lengths; the anterior pair being ſhorteſt of all. Its body is ſlender, and its fore legs are always carried ſtraight forward, ſo as to reach beyond the head in the form of antennæ, Theſe, as well as the other legs, end each in two claws. The eyes are ſmall and not very prominent, and the upper wings are cruſtaceous, the under ones membranaceous, thin, and tranſparent. The middle joint of the leg is ſuch, that the creature can only move them upwards, not downwards; and there runs an acute tongue or proboſcis under the belly, as is the caſe of the water ſcorpion and notonecta. *Ray's Hiſt. Inſects.*

Locust-Tree, in botony. See the articles Hymenæa and Robinia.

LOCUSTÆ, in botany, the tender extremities of the branches of trees, ſuch as, it is ſuppoſed, St John Baptiſt fed on in the wilderneſs.

LODGMENT, in military affairs, is a work raiſed with earth, gabions, faſcines, wool-packs, or mantelets, to cover the beſiegers from the enemy's fire, and to prevent their loſing a place which they have gained, and are reſolved, if poſſible, to keep. For this purpoſe, when a lodgment is to be made on the glacis, covert-way, or in a breach, there muſt be great proviſion made of faſcines, ſand-bags, &c. in the trenches; and during the action, the pioneers with faſcines, ſand-bags, &c. ſhould be making the lodgment, in order to form a covering in as advantageous a manner as poſſible from the oppoſite baſtion, or the place moſt to be feared.

LOEFLINGIA, in botany, a genus of plants whoſe flower conſiſts of an upright cup cut into five ſegments, with five ſmall petals: the ſtamina are compoſed of three filaments, topped with double roundiſh antheræ: the fruit is a three-cornered ovate capſule, with one cell, containing a number of ovato-oblong ſeeds.

LOESELIA, in botany, a genus of plants whoſe flower is monopelous and unequal, cut at the limb into five parts: the fruit is an ovate trilocular capſule, containing a number of angulated ſeeds.

LOG, in the marine, a machine uſed to meaſure the ſhip's way through the ſea.

It is compoſed of three parts, viz. the reel, the line, and a little board formed like the quadrant of a circle, and nearly reſembling the ſhape of thoſe quadrants employed to take the altitude of a tree, ſteeple, or other object. The term Log, however, is more particularly confined to this laſt.

This piece of board is generally from five to ſix inches in the radius, and a quarter of an inch in depth: and round the arching edge of it, is nailed a thin plate of lead, of ſufficient weight to make the log ſwim perpendicularly in the water, and ſo, as that nearly two thirds of it may be immerſed under the ſurface. In the middle of the arch, about a quarter of an inch within the edge, is bored a ſmall hole, and another within the angular point; thro' this laſt is inſerted the end of a piece of line, which being knotted on the other ſide, is drawn tight back to the hole: to the other end of this ſmall cord, which is about two feet long, is faſtened a pin, which is thruſt into the other hole: the log being then ſuſpended horizontally, the line is faſtened to the middle of this ſmall ſtring, ſo that the pin can occaſionally be taken out, and will eaſily come out of itſelf when it meets with any reſiſtance.

The log line, whoſe other end is tied to one of the ſpokes or ſhafts of the reel, is generally from four to ſix hundred feet in length, and is divided into equal ſpaces, which are marked with one, two, three, four knots, &c. the greateſt number being next the reel, and having often ſingle knots between them to determine the half; theſe large ſpaces anſwer to ſo many miles, and the intermediate ones to half miles, and begin from a red rag which is placed at the diſtance of ten, twelve, or fifteen fathoms from the log, in proportion to the height of the ſhip's ſtern.

The diſtance of the knots from each other muſt always be in proportion to the half-minute glaſs, which is turned at the time of throwing the log into the ſea, as the glaſs may run ſlower or faſter than the time it is calculated for, and muſt therefore be often tried by a pendulum, the vibrations of which determine how many ſeconds the glaſs runs.

If the glaſs runs thirty ſeconds, then muſt the diſtance of the knots from each other be 50 feet, if it runs more or leſs, they ought to be corrected in proportion, for,

As thirty ſeconds
Is to fifty feet,
So is the number of ſeconds the glaſs runs
To the length between the knots.

But as the line may often be contracted or lengthened by the moiſture or heat of the weather, it muſt be frequently meaſured and corrected: the glaſs muſt alſo be proved by the pendulum.

Heaving the log is thus performed:

The log-reel, which turns upon an axis or wooden pin about two feet long, and about which the line is wound, is held by one man, and another holds the half-minute glaſs, while the mate of the watch fixes the little pin in the log, and throws it over the ſtern; and as the ſhip ſails, the log ſwimming perpendicular naturally feels a reſiſtance, to prevent which, the mate draws the line quick off the reel, ſo that it makes a ſtraight line in the water, and the log remains nearly in the ſame ſpot where it firſt alighted in the water. The ſpace of line between the log and the red rag, as mentioned above, is to let the log be far enough a-ſtern to be out of the ſhip's eddy or wake, and when this red rag goes over the ſtern, the glaſs is turned; and when the glaſs runs out, the man who held it calls *ſtop*; the log-line is then ſtopped, and the log meeting with great reſiſtance, the pin draws out, after which it is eaſily drawn aboard; and the number of knots and fathoms reckoned from the red rag to the place where the line was ſtopped, determines the ſhip's rate of going for an hour: if the wind ſhould freſhen or abate in the intervals, ſo as to make the ſhip go faſter or ſlower than at the time of heaving the log, the officer generally allows for it at the end of the watch. In ſhips of war and India-men, the log is heaved once an hour; and in common merchant-men once in two hours, or twice in the watch.

Log-Board, a ſort of table divided into ſeveral columns, containing the hours of the day and night, the courſes the ſhip has run; the winds, and all the material occurrences that happen in the 24 hours, or from noon to noon, together with the latitude by obſervation. From this table the ſeveral officers of the ſhip copy the materials, and tranſcribe them, with what additions they can recollect or may think neceſſary to remark in their journals after their own manner.

Log-Book, a book into which the above articles are daily copied, together with every thing material that happens to the ſhip, or is obſerved either at ſea or in a harbour. The diviſions or watches of it, conſiſting of four hours each, are ſigned by the lieutenant or commanding officer of the watch in a ſhip of war or Eaſt-India-man. See the articles Journal and Watch.

Log-Wood, or Campeachy-wood, is the wood of a low prickly tree, which grows plentifully about Campeachy, or the bay of Honduras. See Campeachy-Wood.

Log-wood gives out its colour both to watery and ſpirituous menſtrua, but not readily to either: it requires to be raſped and ground into fine powder, and boiled in ſeveral freſh parcels of the liquors. Rectified ſpirit extracts the colour more eaſily, and from a larger proportion of the wood than water does.

The tinctures both in water and in ſpirit are of a fine red, with an admixture, particularly in the watery one, of a violet or purple. Volatile alkaline ſalts, or ſpirits, incline the colour more to purple: the vegetable and nitrous acids render it pale; the vitriolic and marine acids deepen it.

The watery decoction, wrote with on paper, loſes its redneſs in a few days, and becomes wholly violet. This colour communicates alſo to woollen cloth previouſly prepared by boiling with a ſolution of alum and tartar: the dye is beautiful, but very periſhable. It is often uſed by the dyers, as an ingredient in compound colours, for procuring certain ſhades which are not eaſily hit by other materials.

With chalybeate ſolutions, it ſtrikes a black. Hence it is employed in conjunction with thoſe liquors for ſtaining wood black for picture frames, &c. and with the addition of galls, for dyeing cloth and hats black. The black dyes, in which this wood is an ingredient, have a particular luſtre and ſoftneſs, far beyond thoſe made with galls and vitriol alone: the beauty, however, which it here imparts, is not permanent, any more than its own natural violet dye.

On the ſame principle, it improves alſo the luſtre and blackneſs of writing-ink. Ink made with vitriol and galls, does not attain to its full blackneſs till after it has lain ſome time upon the paper: a due addition of log-wood renders it of a deep black as it flows from the pen, eſpecially when vinegar or white-wine is uſed for the menſtruum.

LOGARITHMIC *Curve*, a curve which explains the nature and properties of logarithms, and is delineated in the following manner:

Upon the line A G (plate LXVI. *fig.* 4.) infinitely extended each way, let there be taken A B, B C, C D, D E, E F, &c. towards the right-hand; alſo A O, O P, &c. towards the left, all equal among themſelves; and from the ſeveral points P, O, A, B, C, D, E, F, &c. let there be drawn the lines R P, O Q, A H, B I, C K, D L, E M, F N, &c. equal in length to the ſeveral lines, in the geometrical ſcale of proportional lines, infinite in number; theſe therefore will repreſent ſo many terms in the progreſſional of proportionals, of which the line A H repreſents unity. Now if the extremities R, Q, H, I, K, L, M, N, &c. of the geometrical ſcale of mean proportionals be connected together by right-lines, the figure P R N F will be a polygon, conſiſting of more or fewer ſides, according as the terms in the ſcales of mean proportionals are more or fewer in number.

If the diſtances A B, B C, D E, E F, &c. are biſſected in the points *b*, *c*, *d*, *e*, *f*, &c. and from theſe points be drawn lines, as *b i*, *c k*, *d l*, *e m*, *f n*, &c. perpendicular to A G, which will be ſo many proportionals between A H, B I, C K, D L, E M, F N, &c. there will ariſe a new ſcale for a ſeries of proportionals between A H, B I, C K, D L, E M, F N, &c. double in number to thoſe of the former ſcale. And if the extremities H, *i*, I, *k*, K, *l*, L, &c. be connected together by right-lines, we ſhall have a new polygon, conſiſting of a greater

greater number of ſides; but each ſide leſs in magnitude.

After the ſame manner, if the diſtance between every two terms be continually biſſected, and to each of the points ſo found, there be applied a ſeries of mean proportionals, the number of terms in this new ſcale, as alſo the ſides of the polygon, will by this means become infinite; and each ſide of the polygon will be leſs than any given right-line, and conſequently the polygon will be changed into a curve-lined figure; ſince every curvilinear figure may be conſidered as a polygon of an infinite number of ſides. The curve thus deſcribed is called the logarithmic curve, in which, if the right-lines A H, B I, &c. which ſtand at right-angles to the axis A G, repreſent ſo many terms in a ſeries of numbers in geometrical progreſſion, the portions of the axis A B, B G, &c. between the place of unity and any given term, will ſhew the place or order that each number in the ſcale of geometrical proportions obtains from the place of unity in the ſame ſeries.

The diſtance therefore between any two numbers, in this continued ſcale of geometrical proportionals, is the logarithm of the ratio of theſe two numbers the one to the other. See the article LOGARITHMS.

LOGARITHMIC *Spiral.* If the quadrant of a circle A N B (plate LXVI. *fig.* 5.) be divided into any number of equal parts, in the points N, *n*, *n*, &c. and from the radii C N, C *n*, C *n*, &c. be cut off C M, C *m*, C *m*, &c. continual proportionals, the points M, *m*, *m*, *m*, &c. will be in the logarithmic ſpiral. And there may be imagined an infinite number of different curves of this kind.

LOGARITHMS, a ſet of artificial numbers, whereby the common operations in multiplication and diviſion are performed by addition and ſubtraction; raiſing powers and extracting roots, are by the help of theſe numbers eaſily performed by multiplication and diviſion.

The word is formed from the Greek, λογος, ratio, and αριτθμος, number.

Logarithms, juſtly eſteemed one of the greateſt and moſt uſeful diſcoveries that the laſt century has produced, were firſt invented by John Neper, baron of Marchiſton, in Scotland, and by him firſt publiſhed at Edinburgh in the year 1614; and ſoon after, by himſelf and Mr. Briggs, (then Savilian profeſſor of geometry in the univerſity of Oxford) reduced into a better form, and publiſhed in London in the year 1624, in the ſame form and manner as they are uſed at this day.

Logarithms may be conſidered as, and are uſually defined to be, a ſeries or rank of numbers in an arithmetical progreſſion, fitted or adapted to the exponents of a ſeries of numbers in a geometrical progreſſion.

If between 1 and x be inſerted a mean proportional, which is $\sqrt{x}$ or $x^{\frac{1}{2}}$, its index $\frac{1}{2}$ ſhews that its diſtance from unity will be but one half of the diſtance of x from unity. In like manner, if between x and x^2 we inſert a mean proportional, its index will be 1 and $\frac{1}{2}$ or $\frac{3}{2}$, inaſmuch as its diſtance from unity is once and a half the diſtance of x from the ſame place of unity.

Again, if between 1 and x be inſerted two mean proportionals, the firſt of theſe will be the cube-root of x or $\sqrt[3]{x}$, and its index will be $\frac{1}{3}$, inaſmuch as its diſtance from the units place is but $\frac{1}{3}$ of the diſtance of x, from the ſame place of unity; and conſequently $\sqrt[3]{x}$ is expreſſed by $x^{\frac{1}{3}}$, whence it follows, that the index of unity is 0, inaſmuch as unity cannot be removed at any diſtance from itſelf.

And the ſame ſeries of geometrical proportionals may be continued on the contrary ſide of unity, or towards the left hand, and which therefore will decreaſe in the ſame manner, or in the ſame ratio, as the terms placed on the right hand increaſe.

For the terms $\frac{1}{x^5}$, $\frac{1}{x^4}$, $\frac{1}{x^3}$, $\frac{1}{x^2}$, $\frac{1}{x}$, 1, x, x^2, x^3, x^4, x^5, &c. are in the ſame geometrical progreſſion continued, and have all the ſame common ratio; wherefore, inaſmuch as the diſtance of x from unity towards the right hand is poſitive, or $+ 1$, the diſtance of $\frac{1}{x}$ from unity towards the left hand, which is equal to the former, is negative or $- 1$, which is therefore the index of $\frac{1}{x}$, and conſequently for $\frac{1}{x}$ may be written x^{-1}.

Again, inaſmuch as x^2 is on the right ſide of unity, and poſitive, and its index $+ 2$, the index of $\frac{1}{x^2}$, which is as far diſtant from unity on the contrary ſide, or towards the left hand, will be negative, and -2, and conſequently $\frac{1}{x^2}$ is the ſame with x^{-2}: In like manner x^{-3} is the ſame with $\frac{1}{x^3}$, and x^{-4} the ſame with $\frac{1}{x^4}$; whence it comes to paſs that the negative indices ſhew that the terms to which they belong, are as far diſtant from unity toward the left hand, as the term whoſe indices are the ſame and poſitive, are removed from unity on the contrary ſide, or towards the right hand.

Again, as between 1 and x, in the ſeries increaſing from or on the right hand of unity, may be inſerted a mean proportional, as $\sqrt{x}$, and between this mean proportional and unity be inſerted another mean proportional, as $\sqrt[4]{x}$, and between the laſt mean proportional and unity be inſerted another mean proportional, as $\sqrt[8]{x}$, &c. whoſe reſpective indices will be $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, &c. ſo between unity and the next term $\frac{1}{x}$ in the ſeries decreaſing from unity, or on the left hand of unity, may be inſerted a mean proportional, as $\frac{1}{\sqrt{x}}$, whoſe correſpondent index will be $-\frac{1}{2}$: and, again, between this mean proportional and unity, may another mean proportional, as $\frac{1}{\sqrt[4]{x}}$, be inſerted, whoſe correſpondent index will be $-\frac{1}{4}$, and between this and unity may another mean proportional be inſerted; the index will be $-\frac{1}{8}$, &c. and as this may be done between any other two terms of the progreſſion, it follows, that between any two terms may an infinite number of mean proportionals be inſerted, whoſe reſpective indices will become the logarithms of the reſpective terms to which they belong: and theſe mean proportionals, the greater they are in number between the two terms of any ratio, the nearer do they approach to a ratio of equality, with their correſpondent indices or exponents.

Hence we are let into the reaſon of the ancient way of making logarithms, and which was made uſe of by their firſt inventors, and that was by a continual extraction of the ſquare-root. In order to this, they firſt extracted the ſquare of 10, and having continued that root to a very great number of places, they extracted the ſquare-root again, and ſo on continually, until they at laſt, after 54 ſuch extractions, obtained the number 1,0000000000000001278191493200323442. Now if this number be firſt ſquared, then cubed, then raiſed to the fourth, fifth, &c. power, it is very certain that, as their increaſe in their ſeveral products ariſe but by ſlow degrees, there will among them be found ſuch as are extremely near in value to the natural numbers 2, 3, 4, 5, &c. and conſequently, by what has been already ſaid concerning the nature of logarithms, thoſe of the natural numbers 2, 3, 4, 5, &c. will be expounded by the exponents, or number of multiplications, which formed the products reſpectively equal (or nearly ſo) to the natural numbers 2, 3, 4, 5, 6, &c. Here we ſee the reaſon why the logarithm of 1 is 0, or rather, that 1 has no logarithm, becauſe the quantity to be continually involved muſt be a ſmall matter greater than 1; for if it be leſs, the powers will decreaſe it.

If logarithms are to be made only to ſeven places of figures, which are ſufficient for common uſe, twenty-five ſucceſſive extractions will do for that purpoſe; that is, we need only extract the 33554432 (or 2 raiſed to the 25th power) root of 10; becauſe in that root there will be found ſeven cyphers before the firſt ſignificant figure after the unit; and in the courſe of theſe extractions, the denominators of the fractions expounding thoſe roots which are neareſt in value to any of the natural numbers 2, 3, 4, 5, &c. will point out their reſpective logarithms.

Some have conſidered the logarithm of a number as the logarithm of the ratio of unity to that number itſelf, or as the diſtance between unity and that number in a geometrical ſcale of proportionals, and conſequently meaſured by the number of proportionals contained between them: logarithms therefore expound the place or order that every number obtains from the unit's place in a continued ſeries or ſcale of proportionals indefinite in number.

Thus, if between unity, and the number 10, there be ſuppoſed 10000000, &c. mean proportionals, that is, if the number 10 be placed in the 10000000th place from unity, between 1 and 2, there will be found 3010300 of ſuch proportionals; that is, the number 2 will be placed in the 3010300th place from unity; between 1 and 3 there will be found 4771213 of the ſame proportionals, or the number 3 will ſtand in the 4771213th place in the indefinite ſcale of proportionals; their numbers 10000000, 3010300, and 4771213, are therefore the logarithms of 10, 2, and 3; or, more properly, the logarithms of the ratios of thoſe numbers one to the other.

Again, if between unity and the number 10, there be ſuppoſed an indefinite ſcale of mean proportionals, whoſe number is 23025851; that is, if the number 10 be placed in the 23025851st place from unity, in the indefinite ſcale of proportionals, between 1 and 2, there will be found to be 6931471 ſuch mean proportionals; and between 1 and 3, there will be found 10986122 of the ſame proportionals: ſo that if the firſt term of the ſeries be called x, the ſecond term will be x^2, the third x^3, &c. and if the number 10 be ſuppoſed to be the 10000000th term in the ſeries, the number 2 will be the 3010300th term, and the number 3 will be the 4771213th term in the ſame ſeries; and conſequently $x^{10000000} = 10$, $x^{3010300} = 2$, and $x^{4771213} = 3$, &c. and again, if the number 10 be ſuppoſed the 23025851ſt term in the ſeries, the number 2 will be the 6931471ſt term, and the number 3 the 10986122d term in the ſame ſeries; and conſequently, in this caſe, $x^{23025851} = 10$, $x^{6931471} = 2$, and $x^{10986122} = 3$, &c.

And as the indefinite number of mean proportionals between any two numbers may be aſſumed at pleaſure, hence logarithms may be of as many different forms (that is, there may be as many different ſcales of logarithms) as there can be aſſumed different ſcales of mean proportionals between any two numbers. Every number therefore is ſome certain power of that number which is placed next to unity in the indefinite ſcale of proportionals between unity and the given number, and the index of that power is the logarithm of the number.

Logarithms therefore may be of as many ſorts as you can aſſume different indices of the power of that number whoſe logarithm is required.

But ſince fluxions and the higher geometry have been ſo well underſtood, mathematicians have directed their views towards facilitating thoſe laborious and operoſe calculations formerly made uſe of for conſtructing tables of logarithms, by help of converging ſeries, and other means, whereby the logarithms of any propoſed numbers may now be obtained with very little trouble: an example of this kind may be ſeen in Mac Laurin's Fluxions, p. 678, vol. ii. where that celebrated mathematician ſhews that, the logarithm of m being given, the logarithm of $\overline{m+2}$ — log. m is equal to $\frac{2z}{2m\times z}$ multiplied by the ſeries $1-\frac{z}{12}\times\overline{\frac{1}{m+z}-\frac{1}{m}}+\frac{z^3}{360}\times\overline{\frac{1}{\overline{m+z}^3}-\frac{1}{m^3}}-\frac{z^5}{1260}\times\overline{\frac{1}{\overline{m+z}^5}-\frac{1}{m^5}}+$ &c. This ſeries converges ſo very ſwift, that two or three terms are ſufficient in almoſt any caſe whatſoever.

The indices, or characteriſtics of logarithms, correſpond to the denominative part of the natural numbers, as the other member of the logarithm does to the denominative part of the number: that is, the index ſhews the denomination, or place of the laſt (or left hand) figure of the number, and conſequently of all the reſt. — Thus 0, affixed to a logarithm, denotes the laſt figure of the number, to which the logarithm anſwers, to be nothing diſtant from (i. e. in) the place of units. The index 1 ſhews the laſt figure of its number to diſtant 1 place from the place of units, i. e. to be in the place of tens, and conſequently the numnumber itſelf te be either 10, or ſome number between that and 100, and ſo of the other indices. Hence all numbers, which have the ſame denomination, but not the ſame numerative parts, are all numbers from 1 to 10, from 10 to 1000, &c. and will have logarithms whoſe indices are the ſame, but the other members different. Again, all numbers, which have the ſame numerative, but not the ſame denominative part, will have different indices, but the reſt of the logarithms the ſame. If a number be purely decimal, to its logarithm is affixed a negative index, ſhewing the diſtance of its firſt real figure, from the place of units. Thus the logarithm of the decimal ,256 is $\bar{1}$,43824; of the decimal ,0256 is $\bar{2}$,30824, &c.

To find the logarithm for a number greater than any in the common tables, but leſs than 10000000.— Cut off four figures on the left hand of the given number, and ſeek the logarithm in the table; add as many units to the index, as there are figures remaining on the right; ſubtract the logarithm found, from the next following it, in the table; then, as the difference of numbers in the canon is to the tabular difference of the logarithms anſwering to them, ſo are the remaining figures of the given number to the logarithmic difference; which, if it be added to the logarithm before found, the ſum will be the logarithm required. Suppoſe the logarithm of the number 92375 were required. Cut off the four figures 9237, and to the characteriſtic of the logarithm correſponding to them, add an unit; then,

From the logarith. of the numb. 9238 = 3,9655780
Subtract logarith. numb. — 9237 = 3,9655309
Remains tabular difference – – – 471

10—471—5
5) 2 — — 1
235

Now to the logarithm – – – – 4,9655309
Add the difference found – – – – 235
The ſum is the logarithm required – 4,9655544

To find the logarithm of a proper fraction.—Subtract the logarithm of the numerator from that of the denominator, and to the remainder prefix the ſign of ſubtraction.—Thus, ſuppoſe it were required to find the logarithm of $\frac{3}{7}$.

Logarithm of 7 = 0,8450980
Logarithm of 3 = 0,4771213
Logarithm of $\frac{3}{7}$ = $\bar{0}$,3679767

To find the number correſponding to a logarithm greater than any in the table.—Firſt, from the given logarithm, ſubtract the logarithm of 10, or 100, or 1000, or 10000, till you have a logarithm that will come within the compaſs of the table; find the number correſponding to this, and multiply it by 10, or 100, or 1000, or 10000, the product is the number required. Suppoſe, for inſtance, the number correſponding to the logarithm 7,7589982 be required; ſubtract the logarithm of the number 10000, which is 4,0000000, from 7,589982; the remainder is 3,7589982, the number correſponding to which is 5741,1, which, multiplied by 10000, gives 57411000, the number required.

To find the number correſponding to a negative logarithm.—To the given negative logarithm, add the laſt logarithm of the table, or that of the number 10000, i. e. ſubtract the firſt from the ſecond, and find the number correſponding to the remainder; this will be the numerator of the fraction, whoſe denominator will be 10000. Suppoſe it be required to find the fraction correſponding to the negative logarithm 0,3679767, ſubtract this from the re-

4,0000000

mainder is 3,6320233, the number correſponding to which is $4285\frac{71}{100}$; the fraction ſought therefore is $\frac{4285}{10000000}$.—The reaſon of the rule is, that as a fraction is the quotient, ariſing from the diviſion of the numerator by the denominator, unity will be to the fraction, as the denominator to the numerator; but as unity is to the fraction correſponding

ing to the given negative logarithm, ſo is 10000 to the number correſponding to the remainder: therefore if 10000 be taken for the denominator, the number will be the numerator of the fraction required.

To find a fourth proportional to three given numbers, add the logarithm of the ſecond to that of the third, and from the ſum ſubtract the logarithm of the firſt; the remainder is the logarithm of the fourth required. Let the given numbers be 4, 68, and 3.

Logarithm 68=1,8325089
Logarithm 3=0,4771213
Sum – – =2,3096302
Logarithm 4=0,6020600
Logarithm required 1,7075732

The number in the tables correſponding to which is 51.

LOGIC, λογικη, the art of thinking and reaſoning juſtly; or, it may be defined, the ſcience or hiſtory of the human mind, inaſmuch as it traces the progreſs of our knowledge from our firſt and moſt ſimple ideas through all their different combinations, conceptions, and all thoſe numerous deduction that reſult from variouſly comparing them one with another. See the articles IDEA and KNOWLEDGE.

The preciſe buſineſs of logic, therefore, is to explain the nature of the human mind, and the proper manner of conducting its ſeveral powers, in order to the attainment of truth and knowledge. It lays open thoſe errors and miſtakes we are apt, through inattention, to run into; and teaches how to diſtinguiſh between truth, and what only carries the appearance of it. By this means, we grow acquainted with the nature and force of the underſtanding; ſee what things lie within its reach; where we may attain certainty and demonſtration; and when we muſt be contented with probability.

Theſe conſiderations ſufficiently evince the uſefulneſs of this ſcience, which is divided into four parts, according to the number of the operations of the mind in its ſearch after knowledge, viz. perception, judgment, reaſoning, and method. See the articles PERCEPTION, &c.

This valuable art of ranging our ideas, connecting them cloſely together, and conſequently of facilitating the tranſition from one to another, ſupplies us with a means of rendering all men's abilities nearly equal. In fact, all our knowledge is reducible to primative ſenſations, which is nearly alike in all men. The art of combining and connecting our direct ideas, only gives them a more or leſs exact arrangement and denomination; whence they become more or leſs ſenſible to others. A man, who readily combines his ideas, differs but little from him who combines them ſlowly; as he who judges of a picture at ſight, differs but little from him who requires to be made ſenſible of all its parts; both, at the firſt glance, have the ſame ſenſations, though they ſink not ſo deep in the ſecond, who therefore dwells longer upon each, to render them ſtrong and diſtinct; and by this means, the reflex ideas of the firſt obſerver become as eaſy to the ſecond as direct ones. And hence, perhaps, there is ſcarce an art or ſcience that may not, by means of a well adapted logic, be taught to a ſlow underſtanding; becauſe there are few arts or ſciences, whoſe precepts or rules may not be reduced to ſimple notions, and diſpoſed in ſo connected an order, that the chain need never be broken. As the mind is more or leſs ſlow in its operations, it requires more or leſs of this connected order. The advantage of a genius is that of having leſs occaſion for it; or rather, of being able to form it quick, and almoſt imperceptibly. See DEMONSTRATION.

LOGISTIC CURVE, the ſame with that otherwiſe called logarithmic. See the article LOGARITHMIC.

LOGISTIC SPIRAL. See LOGARITHMIC and SPIRAL.

LOGISTICA NUMERALIS, the ſame with algorithm. See ALGORITHM.

LOGISTICAL ARITHMETIC, the doctrine of ſexageſimal fractions. See the article SEXAGESIMAL.

LOHOCH, or LOCH, in pharmacy, a compoſition of a middle conſiſtence between a ſoft electuary and a ſyrup, principally uſed in diſorders of the lungs. See LINCTUS.

LOINS, *Lumbi*, in anatomy, the two lateral parts of the umbilical region of the abdomen. See the article ABDOMEN.

LODIUM, darnel, in botany, a genus of plants, the corolla whereof conſiſts of two valves; the lower is narrow, lanceolated, convoluted, acuminated, and of the length of the cup; the other is ſhort, linear, obtuſe, and hollowed upwards: there is no pericarpium; the corolla incloſes the ſeed, which is ſingle, oblong, compreſſed, convex on one ſide, and plane and ſulcated in the middle on the other.

The ſeed of this plant is reckoned attenuant, abſtergent, drying, and heating.

LONCHITIS, ſpleenwort, in botany, a genus of cryptogamious plants of the fern kind, the fructifications of which are diſpoſed in ſmall lines, ſeparately under the ſinuſes of the leaves, and arranged into lunulated ſeries. It grows wild in divers parts of England.

The leaves are of uſe for healing wounds, and in preventing inflammations of them; they are alſo uſed againſt the ſpleen; the root is aperient and diuretic.

LONDON-PRIDE, the Engliſh name for a ſpecies of ſaxifrage. See the article SAXIFRAGE.

LONGÆVITY, from *longus*, long, and *vita*, life, length of life.

We have ſeveral inſtances of longævity, as Parr, who lived one hundred and thirty-two years and nine months; Henry Jenkens, of Yorkſhire, who lived one hundred and ſixty-nine; the counteſs of Deſmond, and Mr. Eccleſtone, both of Ireland, each of whom exceeded one hundred and forty years.

LONG-BOAT, in the marine, the largeſt and ſtrongeſt boat in the ſhip.

The uſe of the long-boat is to carry great bins, ſuch as water, proviſions, anchors, and cables, and often part of the cargo: ſhe is occaſionally equipped with a maſt, ſails, and rigging, ſometimes armed with ſwivels, muſquetoons, and carabines, and can be decked as neceſſity requires.

LONGIMETRY, the art of meaſuring lengths, acceſſible and inacceſſible.

LONGISSIMUS DORSI, in anatomy, a very complex, long, and narrow muſcle, ſituated between the ſpinal apophyſes, and the ſacro-lumbaris, from which it is divided by a fatty or cellular line; but, at the lower part, they are confounded together. It covers the ſemiſpinalis, or tranſverſo-ſpinalis dorſi, and ſemiſpinalis lumborum. Its upper part lies between the ſacro-lumbaris and tranſverſalis colli. This muſcle and the ſacro-lumbaris are common to the back and loins. The longiſſimus dorſi is an aſſiſtant to the ſacro-lumbaris, eſpecially its vertebral portion, which it helps very powerfully both by the multiplicity and inſertions of its fibres, in ſuſtaining the vertebræ of the back and loins, while extended, whether in ſitting or ſtanding, and in preventing their ſinking under the weight of the body, or any additional burden. It aſſiſts in performing, or counterballancing all the motions and inflections which theſe vertebræ, eſpecially thoſe of the loins, are capable of in all poſtures of the body. And in this, it alſo bears ſome reſemblance to the inferior or vertebral portion of the ſplenius: and theſe two muſcles on each ſide, and the ſacro-lumbaris, are of the number of thoſe called vertebrales obliquæ divergentes. *Winſlow's Anat.*

LONGITUDE *of the Earth*, denotes its extent from weſt to eaſt, according to the direction of the equator.

LONGITUDE *of a Star*, &c. in aſtronomy, an arch of the ecliptic, counted from the beginning of Aries, to the place where a ſtar's circle of longitude cuts the ecliptic.

LONGITUDE *of a Place*, in geography, its diſtance from ſome firſt meridian, or an arch of the equator intercepted between the meridian of the place and the firſt meridian.

LONGITUDE, in navigation, the diſtance of a ſhip or place, eaſt or weſt, from one another, counted in degrees of the equator. If this diſtance be counted in leagues, miles, &c. or in degrees of the meridian, and not in thoſe proper to the parallel of latitude, it is uſually called departure.

Since the difference of longitude between any two places is equal to the arch of the equator intercepted between the two meridians paſſing through the two places; which is analogous to the quantity of time that the ſun requires to move from the meridian of one place to that of another; or, in the language of the Copernicans, that is elapſed between the application of the meridian of one of the places to the ſun and the meridian of the other; for, ſince the ſun finiſhes his diurnal revolution in the ſpace of 24 hours, or, which is the ſame thing, ſince the revolution of the earth about her axis is performed in the ſame time, it follows, that in every hour there paſſes over the meridian one-twenty-fourth part of 360 degrees, or of the whole circumference of the equator, equal to fifteen degrees; in two hours, one-twelfth part, or thirty degrees; and, in any greater or leſſer part of time, a proportional greater or leſſer part of the equator; whence it follows, that if the difference of longitude, or arch of the equator intercepted between the meridians paſſing through any two places, be known, the difference of the times of the day in thoſe two places is known alſo; and, conſequently, the hour in one place being known, the hour in the other place is known alſo; and, on the contrary, if the difference between the times at any two places be known, the difference of longitude between thoſe two places is known alſo, by reducing the difference of the times into degrees and minutes, allowing fifteen degrees to an hour, &c.

Hence it is, that if two or more places lie under the ſame meridian, the hour in one will be the ſame with the hour in the other; and, on the contrary, if in two or more places the hour be the ſame, thoſe places lie under the ſame meridian.

And, becauſe the ſun in all places conſtantly riſes in the eaſt, he muſt neceſſarily apply himſelf to the meridian of the eaſtermoſt place firſt, and, conſequently, in that place that lies to the eaſtermoſt, the noon happens ſooneſt; and the hour of the day or diſtance of the ſun from the meridian at any other time muſt be greateſt.

Whence it appears, that if, by any contrivance whatſoever, the hour of the day at the ſame point of abſolute time in two different places can be obtained, the difference of longitude between thoſe places is alſo known; and by comparing the times together, it is eaſy to pronounce which place of the two lies to the eaſtward or weſtward of the other.

Wherefore if two or more perſons can view the ſame appearance at two or more places, and pronounce the time at each place when ſuch appearance was viſible; or if the time when any notable appearance ſhall happen at any place be predicted, and the time when that appearance was viſible at any other place was determined; theſe times being compared together, will give the difference of meridians, or difference of longitude between the two places.

Now ſince an eclipſe of the moon proceeds from nothing elſe but an interception of the earth between her and the ſun, by which means ſhe is prevented from reflecting the light ſhe receives from the ſun, the moment that any part of her body begins to be deprived of the ſolar rays, it is viſible to all thoſe people who can ſee her at the ſame time; whence if two or more different people, at two or more different places, obſerve the times when it firſt began or ended, or note the time when any number of digits was eclipſed, or when the ſhadow begins to cover or quit any remarkable ſpot, the difference of thoſe times, if there be any, when compared together, will give the difference of longitude between the places of obſervation.

The longitudes of places may alſo be determined from the obſervations of ſolar eclipſes; but theſe being incumbered with the conſiderations of parallaxes, are not near ſo proper as thoſe of the moon are; and each of theſe happening but rarely, another excellent expedient has been thought of, and that is the eclipſes of Jupiter's ſatellites.

Jupiter has been found to have four ſatellites or moons conſtantly attending him, always obſerving the ſame laws in moving round about him. See the article JUPITER.

Now as neither Jupiter nor any of his attendants have any native light of their own, but ſhine with a borrowed light from the ſun, it happens that each of theſe, in every revolution about Jupiter, ſuffers two eclipſes, one at their entrance into the ſhadow, the other at the entrance of their paſſage behind his body; whence in each revolution of the ſatellite there are four remarkable appearances, by the obſervation of any one of which the buſineſs may be done, viz. one at the entrance into the ſhadow, and one at the emerſion out of it; one at the entrance behind the body, and another at the coming out; but the latter of theſe, viz. the ingreſs and egreſs of the ſatellite, into and from under the body, is not ſo much regarded by aſtronomers as the immerſion into and out of the ſhadow, becauſe in the former, the difficulty of pronouncing the exact time is very great, it requiring, in each obſerver, eyes equally good and ſtrong, and teleſcopes equally large; but the obſervation of the former of theſe, viz. the immerſion into, and emerſion out of the ſhadow, is eaſy and practicable, becauſe the quick motions of the ſatellites plunge them ſo quick into the ſhadow of Jupiter, that is no difficult matter to pronounce, by any teleſcope, by which they may be ſeen, the exact time of their immerſion and emerſion, as any one may ſoon be ſatisfied, if he will but try the experiment.

Now, inaſmuch as each of theſe happens at the ſame moment of abſolute time, if two or more perſons in different places note the time of obſervation, theſe, when compared together, will give the difference of longitude between the two places of obſervation. And, when we conſider the great number of theſe eclipſes that happen every year, there being more viſible in one year than there are days in it, and, conſequently, but few nights when Jupiter may be ſeen, and which is near eleven months of the year, but that an eclipſe of one or other happens, and ſometimes two or three in a night; the eaſineſs with which they may be made, there requiring only a teleſcope of eight or ten feet in length, which may be almoſt managed with the hand; and the little likelihood there is of miſſing the times of ingreſs or egreſs, they being in a manner momentaneous; and laſtly, the great exactneſs to which they would give the difference of longitude, it being certainly as exact as the latitude can at preſent be taken; it is much to be wondered at, that the more ſkilful part of our ſeamen have ſo long neglected them, and eſpecially in the ſeveral ports into which they ſail.

Beſides theſe, there is another method equally uſeful, expeditious, and certain; and that is, the appulſes of the moon to certain fixed ſtars, and their occultations by the interpoſition of her body; for, the moon finiſhing her revolution in the ſpace of twenty-ſeven days, ſeven hours, forty-three minutes, there are but few clear nights, when the moon does not paſs over, or ſo near to ſome fixed ſtar, that her diſtance from it, or the time of her viſible conjuction with it, may be eaſily obſerved by the teleſcope and micrometer only; and theſe when compared together or with the viſible time computed to the meridian of ſome place when a good theory of the moon ſhall be obtained, will ſhew the difference of longitude of thoſe places.

The lunar theory is already brought to very great perfection, and the Nautical Ephemerides, now preparing by that able mathematician Mr. George Witchel, will, it is hoped, render the method of finding the longitude at ſea very practicable; eſpecially as the ingenious Mr. Maſkeline has already favoured the world with a treatiſe called the Britiſh Mariner's Guide, wherein he has fully explained the method of finding the longitude from obſervations made on the appulſes of the moon to the fixed ſtars.

Mr. Flamſtead has given us the places of near one thouſand fixed ſtars, confirmed by ſeveral obſervations, that lie within the zodiac, each of which will be covered by the moon and the reſt of the planets, in one revolution of their node; ſo that ſcarce one night can happen but ſome one or other of them will be eclipſed, or approached ſo near unto, as to come within the compaſs of a teleſcope, in one place of the earth or other: add to theſe the eclipſes of Jupiter's ſatellites, and it is ſcarce poſſible that any clear night can happen, but the heavens afford us ſome agreeable phænomenon or other, by which the longitude of any place may be duly aſcertained.

In the Philoſophical Tranſactions, N° 1, we have an account of a ſucceſsful experiment made with two pendulum-watches by major Holmes, in a voyage from the coaſt of Guinea home-wards. This and ſome other ſucceſſes encouraged monſieur Huygens ſo far, that, after he had improved the ſtructure of theſe watches, he publiſhed an account at large for ſhewing how and in what manner theſe watches are to be uſed in finding the longitude at ſea, with directions for adjuſting of them and keeping a journal by them; which account the curious reader may ſee at large in the Philoſophical Tranſactions N° 47.

This method has been purſued by the ingenious Mr. John Harriſon, who, after many years labour, has at laſt completed a time-keeper, which has every requiſite neceſſary for finding the longitude at ſea; and from ſeveral experiments, particularly two voyages to the Weſt-Indies, it was found to keep time ſo very accurately as not to vary above a minute in the whole voyage: and he has accordingly received 10,000l. being half the ſtipulated reward for this diſcovery; and will it is preſumed, receive the other moiety as ſoon as his watch ſhall be found to keep time with the ſame degree of accuracy, in the frozen zone. The reader will therefore be pleaſed with finding ſome account of this ingenous contrivance, which we ſhall give from a report delivered to the board of longitude, by Mr. William Ludlam, one of the gentlemen to whom Mr. Harriſon was referred to make a diſcovery of the principles of his time piece.

“ The defects in common watches, ſays Mr. Ludlam, which Mr. Harriſon propoſes to remedy, are the following.

“ 1. That the main-ſpring acts not conſtantly with the ſame force upon the wheels, and through them upon the balance. 2. That the balance, either urged with an unequal force, or meeting with a different reſiſtance from the air or the oil, or the friction, vibrates through a greater or leſs arch. 3. That theſe unequal vibrations are not performed in equal times. 4. That the force of the balance-ſpring is altered by a change of heat.

“ To remedy the firſt defect, Mr. Harriſon has contrived, that his watch ſhall be moved by a very tender ſpring, which never unroals itſelf more than one eight part of a turn, and acts upon the balance through one wheel only. But ſuch a ſpring cannot keep the watch in motion a long time. He has therefore joined another, whoſe office is to wind up the firſt ſpring eight times in every minute, and which is itſelf wound up but once in a day.

“ To remedy the ſecond defect, Mr. Harriſon uſes a much ſtronger balance-ſpring than in a common watch. For if the force of this ſpring upon the balance remains the ſame, whilſt the force of the other varies, the errors ariſing from that variation will be the leſs, as the fixed force is the greater. But a ſtronger ſpring will require either a heavier or a larger balance. A heavier balance would have a greater friction. Mr. Harriſon therefore increaſes the diameter of it. In a common watch it is under an inch, in this of Mr. Harriſon's two inches and two tenths.

“ Had theſe remedies been perfect, it would have been unneceſſary to conſider the defects of the third ſort. But the methods already deſcribed only leſſening the errors, not removing them, Mr. Harriſon uſes two ways to make the times of the vibrations equal, though the arches may be unequal. One is to place a pin, ſo that the balance-ſpring, preſſing againſt it, has its force increaſed; but increaſed leſs when the vibrations are larger; the other to give the palates ſuch a ſhape, that the wheels preſs them with leſs advantage, when the vibrations are larger.

“ To remedy the laſt defect, Mr. Harriſon uſes a bar compounded of two thin plates of braſs and ſteel, about two inches in length, rivitted in ſeveral places together, faſtened at one end, and having two pins at the other, between which the balance ſpring paſſes. If this bar be ſtrait in temperate weather, braſs changing its length by heat more than ſteel, the braſs ſide becomes convex when it is heated; and the ſteel ſide when it is cold: and thus the pins lay hold of a different part of the ſpring in different degrees of heat, and lengthen or ſhorten it, as the regulator does in a common watch.

“ The two firſt of theſe improvments, any good workman who ſhould be permitted to view and take to pieces Mr. Harriſon's watch, and be acquainted with the tools he uſes, and the directions he has given, could, without doubt, exactly imitate. He could alſo make the palates of the ſhape propoſed; but for the other improvements, Mr. Harriſon has given no rules. He ſays, that he adjuſted thoſe parts by repeated trials, and that he knows no other method. This ſeems to require patience and perſeverance; but with theſe qualifications other workmen need not deſpair of ſucceſs equal to Mr. Harriſon's. There is no reaſon to ſuſpect that Mr. Harriſon has concealed from us any part of his art.

“ If our opinion of the excellence and uſefulneſs of this machine be aſked, I muſt fairly own, that nothing but experience can determine the uſe of it with certainty; however, I think it my duty, ſays the above gentleman, to declare to the board the beſt judgment I can form.

“ The firſt of Mr. Harriſon's alterations is, I believe, an improvement, but not very conſiderable. Probably if the other defects in common watches could be removed, the changes in the force of the main-ſpring would not occaſion ſuch errors as would make them uſeleſs at ſea.

" The next alteration ſeems to be of greater importance; I ſuppoſe it contributes more to the exactneſs of the watch, than all the other changes put together; but is attended with ſome inconvenience. The watch is liable to be diſordered, and even ſtopped by almoſt any ſudden motion, and, when ſtopped, does not move again of itſelf. But as it has gone two voyages without any ſuch accident, it may ſeem that this danger at ſea is not conſiderable.

" The principal on which Mr. Harriſon forms the alterations of the third ſort is, that the longer vibrations of a balance moved by the ſame ſpring, are performed in leſs time. This is contrary to the received opinion among the philoſophers and workmen. But if Mr. Harriſon is right, yet whether the method he has propoſed will correct the errors, or not, is to me quite uncertain.

" The laſt alteration beforementioned is ingenious and uſeful; but that it can be made to anſwer exactly to the different degrees of heat, ſeems not probable."

Longitude *of Motion*, according to ſome philoſophers, is the diſtance which the center of any moving body runs through, as it moves on in a right line. See the article Motion.

LONGITUDINAL, in general, denotes ſomething placed lengthwiſe: thus ſome of the fibres of the veſſels in the human body are placed longitudinally, others tranſverſely, or acroſs.

LONICERA, honey-ſuckle, in botany, a genus of plants, the corolla of which is monopetalous and tubulous, the tube is oblong and gibbous; the limb is divided into five parts, one of which is more deeply cut than the reſt, the ſtamina are five ſubulated filaments top'd with oblong antheræ; the fruit is a roundiſh umbilicated berry, having two cells containing roundiſh compreſſed ſeeds. This genus includes the caprifolium, periclymenum, chamæceraſſus and xyloſteum of Tournefort, and the ſymphoricarpos of Dillenius.

LOOF, in ſhip-building, that part of a ſhip where the bow begins, or where the planks of her fore part begin to bend, and round inward as ſhe grows narrower approaching the ſtem. See Bow.

LOOKING-Glasses are nothing but plane mirrors of glaſs; which being impervious to the light, reflect the images of things placed before them; for the theory of which ſee the articles Mirror and Reflection.

For the caſting, grinding, and poliſhing glaſſes, ſee the article Glass.

For foliating of looking glaſſes, ſee the article Foliating.

LOOM, a frame compoſed of a variety of parts, uſed in all the branches of weaving; for a particular deſcription of which, ſee Weaving.

LOOMING, in the ſea-language, appearance, as the ſhip looms large, i. e. appears towering.

LOOP, in the iron works, denotes a part of a ſow, or block of caſt iron, broken or melted off from the reſt.

LOOSE-STRIFE, in botany. See Lysimachia.

LOPPING, among gardeners, the cutting off the ſide branches of trees.

It is very obſervable that moſt old trees are hollow within; which does not proceed from the nature of the trees, but is the fault of thoſe who have the management of them, who ſuffer the tops to grow large before they lop them; as the aſh, elm, hornbeam, &c. and perſuade themſelves, that they may have the more great wood; but in the mean time, do not conſider that the cutting off great tops endangers the life of a tree; or, at beſt wounds it ſo, that many trees yearly decay more in their bodies than the yearly tops come to; and at the ſame time that they furniſh themſelves with more great wood, they do it at the loſs of the owner. And, indeed, though the hornbeam and elm will bear great tops, when the body is little more than a ſhell; yet the aſh, if it comes to take wet at the head, very rarely bears more top after the body of the tree decays. Therefore, if once theſe trees decay much in the middle, they will be worth little but for the fire; ſo that if you find a timber-tree decay it ſhould be cut down in time that the timber be not loſt.

The lopping of young trees, that is, at ten or twelve years old at moſt, will preſerve them much longer, and will occaſion the ſhoots to grow more into wood in one year, than they do in old tops at two or three. Great boughs, ill taken off, ſpoil many a tree; for which reaſon they ſhould always be taken off cloſe and ſmooth, and not parallel to the horizon; and cover the wound with loam and horſe-dung mixed, to prevent the wet from entering into the body of the tree.

When trees are at their full growth, there are ſeveral ſigns of their decay; as the withering or dying of many of their top branches; or if the wet enters at any knot; or they are any wiſe hollow or diſcoloured; if they make but poor ſhoots; or if woodpeckers make any hole in them.

This lopping of trees is only to be underſtood for pollard trees; becauſe nothing is more injurious to the growth of timber-trees, than that of lopping or cutting off great branches from them. Whoever will be at the trouble of trying the experiment upon two trees of equal age and ſize, growing near each other, to lop or cut off the ſide branches from one of them, and ſuffer all the branches to grow upon the other, will in a few years, find the latter to exceed the other in growth every way; and this will not decay near ſo ſoon.

All ſorts of reſinous trees, or ſuch as abound with a milky juice, ſhould be lopped very ſparingly; for they are ſubject to decay when often cut. The beſt ſeaſon for lopping theſe trees is ſoon after Bartholomew-tide; at which time they ſeldom bleed much, and the wound is commonly healed over before the cold weather comes on. *Miller's Gard. Dict.*

The generality of the world are againſt pruning timber trees at all, and, where they naturally grow ſtraight and regular, it is much better let alone. But all common faults in ſhape may be regulated by this lopping them while young, and it can be attended with no ill conſequence to the timber; for the cut not lying near the timber pith cannot affect it, when grown up, and ſquared in the working for beams and other uſes, or to be quartered; for all the defects occaſioned by ſuch wounds, are in the ſuperficial parts, and all the four quarters are perfectly ſound within.

As to the large foreſt trees, they ſhould not be lopped at all, except in caſes of great neceſſity, and then the large boughs muſt not be cut, but only the ſide branches; and even theſe muſt be cut off cloſe, that the bark may ſoon cover the wound, and yet a little ſlanting, that the water may run off, not lodge upon the cut part.

If there is a neceſſity of cutting off a large bough, as by its being broken or cankered, let it be cut off ſlanting at about four feet diſtance from the body of the tree, and that if poſſible near ſome place where there is a young ſhoot from it, which may receive the ſap, and grow up in its place. No ſtump muſt be left ſtanding out farther than this, becauſe they are wounded parts which never can heel, and which will always be letting in the water, and will ſerve as pipes to convey that water into the heart of the body of the tree, and by degrees will utterly ſpoil it. All that grow upright, whether they be large or ſmall branches, muſt in cutting be taken off ſlanting, never evenly, for the ſame reaſon; thoſe boughs that bear from the head are to be cut with the ſlope on the lower ſide, and on any occaſion that great wounds are given to a tree, they ſhould be covered with a mixture of clay and horſe dung, which will make them heal much ſooner than they otherwiſe would do. *Mortimer's Huſbandry.*

LORD, a title of honour given to thoſe who are noble, either by birth or creation; in this ſenſe it amounts to much the ſame as peer of the realm, or lord of parliament. This title, by the courteſy of England, is alſo given to all the ſons of dukes and marquiſes, and to the eldeſt ſons of earls: and it is alſo a title of honour beſtowed on thoſe who are honourable by their employments, as lord advocate, lord chamberlain, lord chancellor, &c.

LORICATION, Coating, in chemiſtry, is the covering a glaſs or earthen veſſel with a coat or cruſt of a matter able to reſiſt the heat, to prevent its breaking in the performing an operation that requires violence of fire.

LOTION, *Lotio*, waſhing, in phyſic, a ſort of medicine compounded of liquid ingredients for beautifying the face, and cleanſing it from any deformity which the blood throws out. It alſo denotes a medicine that holds a medium between a fomentation and a bath.

Lotion, in pharmacy, a preparation of medicines by waſhing in ſome liquid, either to clear them of the dregs, or of ſome ſalt or corroſive ſpirit, or to communicate ſome virtue to them.

LOTUS, bird's-foot, trefoil, in botany, a genus of plants, producing papilionaceous flowers; the vexillum is roundiſh, bent backward with an oblong concave unguis; the alæ are broad, roundiſh, and ſhorter than the vexillum, cloſing together at the top; the carina is gibbous underneath and ſhut above. The fruit is a cylindric pod, conſiſting of two valves, having many tranſverſe partitions, in each of which is placed a roundiſh ſeed.

LOVAGE, in botany, the Engliſh name for the liguſticum. See Ligusticum.

LOVE-Apple, the fruit of a ſpecies of ſolanum, a plant cultivated in gardens among us for the ſingularity of its appearance; the Portugueſe eat this fruit either raw or ſtewed, as do alſo the Jew-families in England.

LOUIS, or *Knight of St.* Louis, the name of a military order in France, inſtituted by Louis XIV. in 1693. Their collars are of a flame colour, and paſs from left to right; the king is their grand maſter.

LOUSE, *Pediculus*, in zoology. See the article Pediculus.

LOWERING, among diſtillers, a term uſed to expreſs the debaſing the ſtrength of any ſpirituous liquor by mixing water with it.

LOXIA, in the Linnæan ſyſtem of zoology, the name of a genus of birds of the order of the paſſeres, the diſtinguiſhing characters of which are, that the tongue is plain, equal, and whole; the beak large, thick, and ſhort, and crooked and convex both ways.

LOZENGE, Lozange, *Rhombus*, in geometry, a quadrilateral figure, conſiſting of four equal and parallel ſides, two of whoſe oppoſite angles are acute, and the other two obtuſe; the diſtance between the two obtuſe ones being always equal to the length of one ſide: when the ſides are unequal this figure is called a Rhomboides, which ſee.

Scaliger derives the word from the Latin *laurengia*, as this figure ſomewhat reſembles that of a laurel leaf.

Lozenge, in heraldry, a rhombus, or figure of equal ſides, but unequal angles, reſembling a quarry of glaſs in our old windows, placed erect, pointwiſe. It is in this figure that all unmarried gentlewomen and widows bear their coats of arms; becauſe, as ſome ſay, it was the figure of the Amazonion ſhield; or, as others, becauſe it is the ancient figure of the ſpindle.

Lozenge, in pharmacy, the ſame with what is otherwiſe called troche. See the article Troche.

LUCERNE, in botany, &c. a plant frequently cultivated in the manner of clover, and known among authors by the names of the medica and medicago.

It is the alfaſa of the Spaniards, and the lucerne, grand treffle, or fænum Burgundiacum, as ſome botaniſts call it, of the French. It has a perennial root, and an annual ſtalk, which riſes full three feet high in good land, and is garniſhed at each point with trifoliate leaves, whoſe lobes are ſpear-ſhaped, about an inch and a half long, and half an inch broad, ſawed towards the ſtalks. The flowers grow in ſpikes, which are from two to near three inches in length, ſtanding upon naked foot-ſtalks two inches long, riſing from the wings of the ſtalks: they are of the pea-bloom, or butterfly, kind; of a fine purple colour, and are ſucceeded by compreſſed moon-ſhaped pods, which contain ſeveral kidney-ſhaped ſeeds. It flowers in June, and its ſeed ripens in September.

There are the following varieties of this ſpecies of lucerne, viz. one with violet-coloured flowers; another with yellow flowers; a third with yellow and violet flowers mixed; and a fourth with variegated flowers: but, as Mr. Miller obſerves, theſe are only variations of the ſame plant, ariſing accidentally from the ſeed. However, neither the yellow nor the variegated flowered lucerne, is ever ſo ſtrong as that with purple flowers, nor is it, conſequently, ſo profitable to the huſbandman.

Columella calls this the choiceſt of all fodder, becauſe it will laſt ten years, and will bear being cut down four, and ſometimes ſix times in a year; it enriches the land on which it grows, fattens the cattle fed with it, and is a remedy for ſick cattle. About three quarters of an acre of it is abundantly ſufficient to feed three horſes during the whole year. Yet, notwithſtanding it was ſo much eſteemed by the ancients, and hath been cultivated to great advantage in France and Switzerland for many years, it has not yet found ſo good a reception in England as it juſtly deſerves; nor is it cultivated here in any conſiderable quantity, though it will ſucceed as well in this country as in either of the laſt mentioned; being extremely hardy, and reſiſting the ſevereſt cold of our climate.

The ſoil in which this plant is found to ſucceed beſt, in this country, is a light, dry, looſe, ſandy land, which ſhould be well ploughed and dreſſed, and the roots of all noxious weeds, ſuch as couch-graſs, &c. deſtroyed; otherwiſe they will overgrow the plants while young, and prevent their progreſs.

The beſt time to ſow the ſeed is about the middle of April, when the weather is ſettled and fair; for if you ſow it when the ground is very wet, or in a rainy ſeaſon, the ſeeds will burſt and come to nothing, as is often the caſe with ſeveral of the leguminous plants; therefore, you ſhould always obſerve to ſow it in a dry ſeaſon, and if there happens ſome rain in about a week or ten days after it is ſown, the plants will ſoon appear above-ground.

After having well ploughed and harrowed the land very fine, you ſhould make a drill quite acroſs the ground, almoſt half an inch deep, into which the ſeeds ſhould be ſcattered very thin; then cover them over a quarter of an inch thick, or ſomewhat more, with the earth: then proceed to make another drill, about a foot and a half from the former, ſowing the ſeeds therein in the ſame manner as before, and ſo proceed through the whole ſpot of ground, allowing the ſame diſtance between each row, and ſcatter the ſeeds very thin in the drills. In this manner, an acre of land will require about ſix pounds of ſeed: for when it is ſown thicker, if the ſeeds grow well, the plants will be ſo cloſe as to ſpoil each other in a year or two, the heads of them growing to a conſiderable ſize, as will alſo the roots, provided they have room; for the crown of ſome will meaſure eighteen inches diameter; from which near four hundred ſhoots have been cut at one time, which is an extraordinary increaſe, and this upon a poor, dry, gravelly ſoil, which had not been dunged for many years, but the roots were at leaſt ten years old; ſo that if this crop be well cultivated, it will continue many years, and be equally good as when it was firſt ſown: for the roots generally run down very deep in the ground, provided the ſoil be dry; and although they ſhould meet a hard gravel a foot below the ſurface, yet their roots would penetrate it and make their way downward, ſome of them having been taken up, which were above a yard in length, and had run two feet into a rock of gravel, ſo hard as not to be looſened without mattocks, and crows of iron, and that with much difficulty.

The reaſon for directing this ſeed to be ſown in rows is, that the plants may have room to grow; and for the better ſtirring the ground between them, to deſtroy the weeds, and encourage the growth of the plants, which may be very eaſily effected with a Dutch hoe, juſt after the cutting the crop each time, which will cauſe the plants to ſhoot again in a very little time, and be much ſtronger than in ſuch places where the ground cannot be ſtirred: but when the plants firſt come up, the ground between ſhould be hoed with a common hoe; and if in doing this you cut up the plants where they are too thick, it will cauſe the remaining to be much ſtronger. This hoeing ſhould be repeated two or three times while the plants are young, according as the weeds are produced, obſerving always to do it in dry weather,

ther, that the weeds may the better be deſtroyed; for if be done in moiſt weater, they will root and grow again.

With this management, the plants will grow to the height of two feet, or more, by the beginning of Auguſt, when the flowers will begin to appear, at which time the lucerne ſhould be cut, obſerving to do it in a dry ſeaſon, if it is to be made hay, and keep it often turning, that it may ſoon dry, and be carried off the ground: for if it lie long upon the roots, it will prevent their ſhooting again. After the crop is taken off, you ſhould ſtir the ground between the rows with a hoe, to kill the weeds, and looſen the ſurface, which will cauſe the plants to ſhoot out again in a ſhort time, ſo that by the beginning of September there will be ſhoots four or five inches high, when you may turn in ſheep upon it to feed it down: nor ſhould the ſhoots be ſuffered to remain upon the plants, which would decay when the froſty weather comes on, and fall down upon the crown of the roots, and prevent their ſhooting early the ſucceeding ſpring.

The beſt way therefore is to feed it until November, when it will have done ſhooting for that ſeaſon: but it ſhould not be fed with large cattle the firſt year, becauſe the roots being young, would be in danger of being deſtroyed, either by their trampling upon them, or their pulling them out of the ground: but ſheep will be of ſervice to the roots by dunging the ground, provided they do not eat too cloſe, ſo as to endanger the crown of the roots.

In the beginning of February, the ground between the rows ſhould be again ſtirred with the hoe, to encourage them to ſhoot again: but in doing this you ſhould be careful not to injure the crown of the roots, upon which the buds are at that time very turgid, and ready to puſh. With this management, if the ſoil be warm, by the middle of March the ſhoots will be five or ſix inches high, when, if you are in want of fodder, you may feed it down till a week in April; after which it ſhould be ſuffered to grow for a crop, which will be fit to cut the beginning of June, when you ſhould obſerve to get it off the ground as ſoon as poſſible, and ſtir the ground again with the Dutch hoe, which will forward the plants ſhooting again; ſo that by the middle, or latter end of July, there will be another crop fit to cut, which muſt be managed as before; after which it ſhould be fed down again in autumn: and as the rows by this time will have taken deep hold in the ground, there will be little danger of hurting them, if you ſhould turn in larger cattle; but you muſt always obſerve not to ſuffer them to remain after the roots have done ſhooting, leſt they ſhould eat down the crown of the roots below the buds, which would conſiderably damage, if not deſtroy them.

In this manner you may continue conſtantly to have two crops to cut, and two feedings upon this plant; and in good ſeaſons there may be three crops cut, and two feedings, which will be a great improvement, eſpecially as this plant will grow upon dry barren ſoils, where graſs will come to little, and be of great uſe in dry ſummers, when graſs is often burnt up: and as it is an early plant in the ſpring, ſo it will be of great ſervice when fodder falls ſhort at that ſeaſon, when it will be fit to feed at leaſt a month before graſs or clover; for this plant is often eight inches high by the middle of March, at which time the graſs in the ſame place is ſcarcely one inch high.

Cold will not injure this plant; for in the very cold winter, 1728-9, ſome roots of this plant which were dug up in October, and laid upon the ground in the open air till the beginning of March, were again planted, and they ſhot out very vigorouſly ſoon after: nay, even while they lay upon the ground, they ſtruck out ſhoots from the under ſide of the roots, and had begun to ſhoot green from the crown of the roots: but wet will altogether deſtroy the roots; for a little of the ſeed being ſown upon a moiſt ſpot of ground for a trial, it came up very well, and flouriſhed exceedingly during the ſummer ſeaſon; but in winter, when the great rains fell, the roots began to rot at bottom; and before the ſpring moſt of them were deſtroyed.

The beſt places to procure the ſeed from, are Swiſſerland, and the northern parts of France, which ſucceeds better with us than that which comes from a more ſouthern climate: but this ſeed may be ſaved in England in great plenty; in order to which, a ſmall quantity of the plants ſhould be ſuffered to grow uncut till the ſeeds are ripe, when it muſt be cut, and laid to dry in an open barn, where the air may freely paſs through: but the ſeed muſt be defended from the wet; for if it be expoſed thereto, it will ſhoot while it remains in the pod, whereby it will be ſpoiled. When it is quite dry, it muſt be threſhed out, and cleanſed from the huſk, and preſerved in a dry place till the ſeaſon for ſowing it: and this ſeed ſaved in England is much preferable to any brought from abroad; the plants produced from it being much ſtronger than thoſe produced from the French, Helvetian, and Turky ſeeds, which are ſown at the ſame time, and on the ſame ſoil and ſituation.

LUCID INTERVALS, in lunatics, the times wherein they appear to be in their full ſenſes. See the article LUNATIC.

LUCIDA, in aſtronomy, an appellation given to ſeveral fixed ſtars, on account of their ſuperior brightneſs; as the lucida coronæ, a ſtar of the ſecond magnitude, in the northern crown; the lucidæ hydræ, or cor hydræ; and the lucida lyræ, a ſtar of the firſt magnitude in that conſtellation.

LUCIUS, the pike, or jack, in ichthyology, a ſpecies of eſox, with a depreſſed roſtrum.

The pike grows to a conſiderable ſize, but uſually is found from fourteen inches to two feet in length: it is all over variegated with round yellowiſh ſpots. It is a well known and very voracious fiſh.

LUES, among phyſicians, is, in general, uſed for a diſeaſe of any kind; but, in a more particular ſenſe, is reſtrained to contagious and peſtilential diſeaſes: thus the lues Gallica, or venerea, ſignifies the venereal diſeaſe.

LUFF, amongſt ſailors, the order from the pilot to guide the ſhip's head nearer to the direction of the wind, or nearer to that part of the horizon from which the wind bloweth.

She keeps a good Luff, i. e. holds her way well, without deviating to the leeward of her courſe. See the article Leeward.

Luff-Tackle, a complication of pullies, conſiſting of two blocks, which may be either both of them double, or one of them ſingle. The rope which forms the tackle, and is called the fall, is paſſed alternately through the blocks, and then has its end faſtened to one of them, till it becomes four or five fold: the mechanical power of a luff-tackle is very great, inſomuch that three or four men will draw as much weight with this as ſeven or eight would with a ſingle rope faſtened to the ſame body. See the article Tackle.

LUKE, or *Goſpel of St.* Luke, a canonical book of the New Teſtament.

Some think it was properly St. Paul's Goſpel, and that when that apoſtle ſpeaks of his Goſpel, he means what is called St. Luke's. Irenæus ſays, that St. Luke digeſted into writing what St. Paul preached to the gentiles; and Gregory Nazienzen tells us, that St. Luke wrote with the aſſiſtance of St. Paul.

“ St. Luke, ſays a modern writer, is pure, copious, and flowing, in his language, and has a wonderful and entertaining variety of ſelect circumſtances in his narration of our Saviour's divine actions. He acquaints us with numerous paſſages of the evangelical hiſtory, not related by any other Evangeliſt; both in his Goſpel and Apoſtolical Acts, he is accurate and neat, clear and flowing, with a natural and eaſy grace: his ſtyle is admirably accommodated to the deſign of his hiſtory; it had a good deal of reſemblance to that of his great maſter St. Paul; and, like him, he had a learned and liberal education. I believe he had been very converſant with the beſt claſſics; for many of his words and expreſſions are exactly parallel to theirs.” *Blackwall's Sacred Claſſics.*

St. Luke *the Evangeliſt's Day*, a feſtival in the Chriſtian church, obſerved on the eighteenth of October.

LUMBAGO, in phyſic, a violent pain in the loins, which affects the patient in ſuch a manner that he can ſcarcely move. It is a ſcorbutic ſymptom, and frequently excited by the gout or rheumatiſm.

LUMBARIS, a name given to the arteries and veins which ſpread over the loins; or an epithet to diſtinguiſh thoſe branches of the aorta which carry the blood to the muſcles of the loins, to thoſe of the abdomen and other of the circumjacent parts, and alſo to certain veins which bring back the blood from the loins into the trunk of the vena cava.

LUMBRICAL, a name given to four muſcles of the fingers, and to as many of the toes. They are in each called the flexors of the firſt phalanx: thoſe of the fingers ariſe deep and tendinous, and are inſerted into the firſt phalanges on the ſide next the thumb: thoſe of the toes have their origin from the tendon of the muſculus perforans, and from the interior part of the calcaneum: their termination is at the firſt phalanx of the ſeveral toes.

LUNA, in aſtronomy, the moon. See the article Moon.

Luna, among chemiſts, ſignifies ſilver. See Silver.

LUNAR, ſomething belonging to the moon; thus we ſay lunar month, lunar year, lunar dial, lunar eclipſe, &c. See the articles Moon, Month, Year, &c.

LUNARIA, moon-wort in botany, a genus of plants whoſe flower is tetrapetalous and cruciform, it hath ſix ſtamina, two of which are ſhorter than the reſt; the fruit is a large, erect, plane, compreſſed, elliptical pod, opening with two valves, and containing two cells, which incloſe a few compreſſed kidney-ſhaped ſeeds.

LUNATIC, a perſon affected with lunacy, the cure of which is to be attempted by evacuations of all kinds; as bleeding, vomiting, cathartics, &c. See Madness.

LUNGS, a part of the human body, which is the cauſe or inſtrument of reſpiration. The lungs are the large viſcus of the thorax: they are ſituated in the two ſides of it, with the heart as it were between them; and are connected, by means of the mediaſtinum, with the ſternum and vertebræ; with the heart by means of the pulmonary veſſels, and immediately with the aſpera arteria. The colour of the lungs, in infants, is a fine florid red; in adults it is darker; and in old people, livid, or variegated with black and white. When inflated, they have ſome reſemblance to the hoof of an ox: and are convex on the upper ſide, and concave underneath. They are divided into two large lobes, the right and left; the left, which is the ſmaller, is divided again into three ſmaller ones. The membrane with which the lungs are ſurrounded, is continuous with the pleura. The ſubſtance of the lungs is ſpongeous, or veſiculous, and they ſeem, indeed, entirely compoſed of a number of ſmall veſicles of a fleſhy texture, and of a variety of veſſels.

The veſſels of the lungs are the bronchia, the bronchial artery and vein, the pulmonary artery and vein, the nerves, and the lymphatics. See Bronchia, &c.

The uſes of the lungs are, 1. To perform the office of reſpiration, by which the blood is attenuated in the plexus of the arteries called the rete vaſculoſum. 2. To be aſſiſtant to the voice in ſpeaking and to the ſenſe of ſmelling. They are alſo emunctories of the blood, and are of many other important ſervices.

Lung-Wort, *Pulmonaria*, in botany. See Pulmonaria.

LUNISOLAR Year, in chronology, a period of years produced by multiplying the cycle of the moon, 19, by 28, that of the ſun; the product is 532; in which ſpace of time theſe luminaries return to the ſame point in the heavens.

LUNULA, in geometry, a plane figure like a creſcent, or half moon, for the quadrature of which, ſee Quadrature.

LUPERCALIA, in antiquity, a feſtival of the antient Romans in honour of the god Pan, obſerved on the fifteenth of February, and ſo called from the luperci, the prieſts of that fabulous deity.

LUPIA, in ſurgery, a kind of incyſted tumor, called alſo talpa and teſtuda. See Encysted and Tumor.

LUPINUS, *Lupine*, in botany, a genus of plants, the corolla of which is papilionaceous; the vexillum is cordated, roundiſh, and emarginated; the alæ are oval, and almoſt of the ſame length with the vexillum; the carina is divided into two ſegments at the baſe: the fruit is a large, oblong, coriaceous, compreſſed, acuminated pod, containing only one cell, which includes ſeveral roundiſh compreſſed ſeeds.

LUPULMUM, in botany, a ſpecies of trefoil. See the article Trefoil.

LUPULUS, the hop, in botany, &c. See the article Hop.

LUPUS, the wolf, in zoology. See the article Wolf.

Lupus Marinus, the ſea-wolf, in ichthyology, conſtitutes a diſtinct genus of malacopterygious fiſhes; with a compreſſed body, and ſix or more oſſicles in the membrane of the gills. On the back there is only one fin, which extends almoſt from the head to the tail. It is a very ſingular fiſh, growing to four or five feet long.

Lupus, in aſtronomy, a conſtellation of the ſouthern hemiſphere. See Centaur.

LURE, in falconry, a device of leather, in the form of a bird, with two wings ſtuck with feathers, and baited with a piece of fleſh; wherewith to reclaim or call back a hawk, when at a conſiderable diſtance.

LUSERNE, or Lucerne. See the article Lucerne.

LUSTRATION, in antiquity, ſacrifices or ceremonies by which the ancients purified their cities, fields, armies, or people, defiled by any crime or impurity.

LUSTRE, the gloſs or brightneſs appearing on any thing, particularly on manufactures of ſilk, wool, or ſtuff. It is likewiſe uſed to denote the compoſition or manner of giving that gloſs.

The luſtre of ſilks is given them by waſhing in ſoap, then clear water, and dipping them in alum-water cold. To give ſtuffs a beautiful luſtre, for every eight pounds of ſtuff allow a quarter of a pound of linſeed; boil it half an hour, and then ſtrain it through a cloth, and let it ſtand till it is turned almoſt to a jelly: afterwards, put an ounce and a half of gum to diſſolve twenty-four hours; then mix the liquor, and put the cloth into this mixture; take it out, dry it in the ſhade, and preſs it: if once doing is not ſufficient, repeat the operation. Curriers give a luſtre to black leather, firſt with juice of barberries, then with gum-arabic, ale, vinegar, and Flander's glue, boiled together. For coloured leather they uſe the white of an egg beaten in water. Moroccoes have their luſtre from juice of barberries and lemon or orange. For hats, the luſtre is frequently given with common water, ſometimes a little black dye is added: the ſame luſtre ſerves for furs, except that for very black furs they ſometimes prepare a luſtre of galls, copperas, Roman alum, ox's marrow, and other ingredients.

LUSTRUM, in Roman antiquity, a general muſter and review of all the citizens and their goods, which was performed by the cenſors every fifth year, who afterwards made a ſolemn luſtration.

LUTE, or Luting, among chemiſts, a mixed, tenacious, ductile ſubſtance, which grows ſolid with drying, and when applied to the junctures of veſſels for diſtillation, ſtops them up.

When the ſubject is merely aqueous, linſeed meal, ground fine, and well worked up into a ſtiff paſte with the white of an egg, makes a proper luting; it grows hard with heat, and if it happens to crack, it is repaired by a freſh application.

In the diſtillation of all fermented inflammable ſpirits and volatile alkaline ſalts, a paſte made of the ſame meal, well worked up with cold water, anſwers very well.

In the diſtillation of mild acids or acetous liquors, a bladder ſteeped in water, till it grows ſlimy, makes an excellent luting.

A luting that requires a ſtony hardneſs is neceſſary in the diſtillation of foſſil acids, as vitriol, ſea-ſalt, &c. which is called the philoſophical luting, and may be prepared from the calx of copperas and quick-lime, by boiling the caput mortuum in vitriol, in ſeveral parcels of water, till thoroughly waſhed, then drying the powder and preſerving it in a cloſe veſſel. This powder is to be rubbed with an equal quantity of quick-lime, and wrought into a paſte with the whites of eggs firſt beat thin; and this luting is immediately to be applied to the veſſel, being firſt a little heated: or beat pure ſand and potter's clay together in ſuch proportion with water, till the matter no longer ſticks to the fingers; then add a fourth part of common lime, and the drier this is applied, the better, provided it be left ductile, and the cracks are eaſily ſtopped up by the ſame.

To coat veſſels in the ſtronger diſtillations with a naked fire, beat fat potter's earth and powdered ſand with water into a well wrought paſte, which will not ſtick to the fingers, adding a little common lime at the laſt, and beating them together: then the veſſel being expoſed to the vapour of hot water, ſpread the cement all over it equably with the hand, afterwards ſprinkle the ſurface of the coating with hot and dry ſand, and let the coat dry ſlowly in a cool place, minding to fill up the cracks.

The London chemiſts uſe for the ſame purpoſe ſifted wood-aſhes, beat up to a due conſiſtence with the white of eggs and a little gum-water. The ſame ſervice may be performed in a more excellent manner, by a mixture of linſeed-oil and ceruſs made by inſolation or decoction, and afterwards ground upon a marble with freſh ceruſs, till the whole be of the conſiſtence of an unguent.

Lute is alſo a muſical inſtrument with ſtrings.

LUTHERANS, the Chriſtians who follow the opinions of Martin Luther, one of the principal reformers of the church in the ſixteenth century.

LUTHERN, in architecture, a kind of window over the corniche, in the roof of a building, ſtanding perpendicularly over the naked of a wall, and ſerving to illuminate the upper ſtory.

Lutherns are of various forms, as ſquare, ſemicircular, round; called bulls-eyes, flat arches, &c.

LUTRA, the otter, in zoology. See the article Otter.

LUTUM, among chemiſts, denotes a lute; and *lutum ſapientiæ*, the hermetical ſeal. See Lute and Hermetical.

LUXATION, *Luxatio*, in ſurgery, the receſs or removal of the moveable extremity of a bone from the hollow or ſocket in which it naturally moved, accompanied with a hindrance of motion. This removal is either total or partial; the former is a luxation, and the latter a diſtortion.

LYCANTHROPY, *Lycanthropia*, in phyſic, a ſpecies of madneſs or melancholy, in which the patients wander about in the night-time, and in every thing imitating the wolves. Some bite and ſnarl like dogs, and hence it has been called cynanthropy. The word is derived from the Greek λυκος, a wolf, and ανθρωϖος, a man.

LYCEUM, in Grecian antiquity, an academy ſituated upon the banks of the Iliſſus at Athens. It was compoſed of porticos and walks, where Ariſtotle taught philoſophy; walking there conſtantly every day till the hour of anointing, whence he and his followers were called Peripatetics. See Peripatetics.

LYCHNIDEA, in botany. See the article Phlox.

LYCHNIS, campion, in botany, a genus of plants whoſe flower conſiſts of five petals, the ungues of which are of the ſame length with the cup, with a plane broad border: it hath ten filaments alternately ranged, and terminated with incumbent antheræ: the fruit is an oblong, oval, unilocular capſule, opening with five valves, containing a number of roundiſh ſeeds.

A ſpecies (commonly called ſcarlet-lychnis) is cultivated in our gardens for the ſake of its beautiful flowers; it is propagated by ſowing its ſeeds in the ſpring, and afterwards tranſplanted where they are to remain: a variety of this ſpecies, producing double flowers, is increaſed by parting the roots in autumn, or from cuttings in June.

LYCIUM, box-thorn, in botany, a genus of plants, whoſe flower is monopetalous and infundibuliform; the tube is cylindraceous and incurved, and the limb divided into five obtuſe ſegments: the ſtamina are five very ſhort filaments, topped with erect antheræ: the fruit is a roundiſh bilocular berry, containing a number of kidney-ſhaped ſeeds.

LYCODONTES, in natural hiſtory, the petrified teeth of the lupus piſcis, or wolf-fiſh, frequently found foſſile. They are of different ſhapes, but the moſt common kind riſe into a ſemi-orbicular form, and are hollow within, ſomewhat reſembling an acorn cup: this hollow is found ſometimes empty, and ſometimes filled with the ſtratum in which it is immerſed. Many of them have an outer circle, of a different colour from the reſt.

LYCOPERDON, puff-ball, in botany, a genus of funguſes, of a fleſhy ſubſtance like other muſhrooms, and roundiſh ſhape. They are ſometimes ſeſſile, and ſometimes ſtand on a thick pedicle: they produce ſeparate male and female flowers, contained in the cellular fungous ſubſtance, which remains a long time confuſed, and the fructifications not formed: and when they are formed, and the cells diſtinct, it is but a very ſhort time before the very matter of the cells breaks to powder, and the ſeeds fall out of the cavities of the placentæ; and the whole matter, powder, ſeeds, and filaments, of the placentæ, are diſcharged altogether in form of a fine duſt.

Of this genus there are a great many ſpecies, the moſt remarkable of which is the ſtarry-lycoperdon, with multifid rays, and a ſtellated oſculum.

LYCOPODIUM, wolf's-claw-moſs, in botany, a genus of moſſes conſiſting of branches, furniſhed with leaves, and producing ſpikes, formed of ſquamæ of a different figure from the leaves, at the baſes of which are placed bivalvular kidney-ſhaped antheræ, which is the only diſcoverable part of the male flowers; the female flower conſiſts of a tetraphyllous calyx, without a piſtillum; and the ſeed are only a naked corculum, without cotyledon or tunic.

LYCOPUS, water hore-hound, in botany, a genus of plants, the flower of which is monopetalous; the tube is cylindraceous, and the border cut in four obtuſe ſegments: it hath two filaments, topped with ſmall antheræ: there is no pericarpium; but the ſeeds, which are roundiſh and four in number, are placed in the bottom of the cup.

LYING-TO, or LYING-BY, in navigation, arranging the ſails in ſuch a ſituation that they counteract each other nearly with equal effort, ſome of them drawing her forward, and others forcing her back; the effect of which is, that ſhe makes no way through the ſea, only a very little to the leeward. The intent of lying by, in general, is to wait for ſome ſhip or boat which is approaching or expected; or in the night-time to prevent running on land, ſhoals, or in the way of danger apprehended to be near.

LYING-TO *in a Storm*, is going with a very little ſail to keep the ſhip from rolling violently, and is more properly expreſſed trying. See TRYING.

LYMPH, *Lympha*, a fine fluid, ſeparated in the body from the maſs of blood, and contained in peculiar veſſels.

LYMPHATICS, or LYMPHEDUCTS, in anatomy, fine ſmall veſſels that convey the lymph.

LYNX, or OUNCE, in zoology, a ſpecies of the felis kind, with a truncated tail, a brown body ſpotted with black; the head is large, but not very long; the forehead is flat; the eyes are very large and fierce; the ears are very large and open, but they terminate in a point at the top, and are there ornamented with a pencil of fine black hairs; the mouth is furniſhed with very terrible teeth, and there are whiſkers about it, as alſo over the eyes; the neck is long and thick, the breaſt large and broad, the legs ſtrong, the claws terrible, the tail ſhort and abrupt; and the whole animal large and robuſt, ſomewhat leſs than the lion, very fierce, and remarkable for the quickneſs of its ſight.

LYRE, *Lyra*, a muſical inſtrument of the ſtring king, much uſed by the ancients. See CITHARA.

The lyre, among poets, painters, ſtatuaries, carvers, &c. is attributed to Apollo and the Muſes.

LYRE, *Lyra*, in aſtronomy, a conſtellation of the northern hemiſphere, the number of whoſe ſtars in Ptolemy's and Tycho's catalogues are only ten, but nineteen in the Britannic catalogue.

LYRIC, in general, ſignifies ſomething ſung or played on the lyre; but it is more particularly applied to the ancient odes and ſtanzas, anſwering to our airs and ſongs, and may be played on inſtruments.

LYSIMACHIA, looſe-ſtrife, in botany, a genus of plants whoſe flower is monopetalous and rotated; the limb is divided into five oblong, oval, ſpreading ſegments; it hath ſubulated filaments topped with acuminated antheræ: the fruit is a globoſe unilocular capſule, opening with ten valves, and contains a number of angulated ſeeds: the receptacle is large, globoſe, and punctated.

LYTHRUM, willow-herb, in botany, a genus of plants, the corolla of which conſiſts of ſix oblong, obtuſe, patent petals, inſerted by their ungues into the indentures of the cup; it hath ten ſlender ſtamina; and the fruit is an oblong acuminated capſule, having two cells, which are filled with a great number of ſmall ſeeds.

M.

M, A liquid conſonant, and the twelfth letter of the alphabet.

The ſound of this letter is formed by ſhutting the lips, and thereby intercepting the breath, as it is ſtrongly expreſſed through the mouth and noſtrils jointly. Its ſound is always the ſame in Engliſh; it ſuffers no conſonant after it in the beginning of words and ſyllables, unleſs in ſome derived from the Greek, as *amneſty*, &c.

M. in preſcription, ſignifies a maniple, or handful; and at the end of a receipt it imports *miſce*, or mingle.

M, in aſtronomy, &c. denotes meridional, ſouthern; ſometimes *meridies*, or mid-day.

M, in law, the brand of a perſon convicted of manſlaughter, and admitted to the benefit of the clergy; it is burnt on the brawn of the left thumb.

M, among the ancients, was a numeral letter, ſignifying one thouſand; and when a daſh was added at the top of it, as $\overline{M}$, it ſignified a thouſand times a thouſand.

MABBY, according to Mr. Boyle, is a kind of wine made from potatoes, and ſaid to be uſed in Barbadoes.

MACAO, or MACAW, in ornithology, a name given to the larger ſpecies of parrots with very long tails.

MACARONIC, or MACARONIAN, an appellation given to a burleſque kind of poetry, made up of a jumble of words of different languages, and words of the vulgar tongue latinized.

MACCABEES, two apocryphal books of Scripture: ſo called from Judas Mattathias, ſurnamed Maccabeus. The firſt book of the Maccabees is an excellent hiſtory, and comes neareſt the ſtyle and manner of the ſacred hiſtorians of any extant. It contains the hiſtory of forty years, from the reign of Antiochus Epiphanes to the death of Simon the high-prieſt; that it, from the year of the world 3829 to the year 3869, 131 years before Chriſt. The ſecond book of the Maccabees begins with two epiſtles ſent from the Jews of Jeruſalem to the Jews of Egypt and Alexandria, to exhort them to obſerve the feaſt of the dedication of the new altar, erected by Judas on his purifying the temple. After theſe epiſtles follows the preface of the author to his hiſtory, which is an abridgement of a larger work, compoſed by one Jaſon, a Jew of Cyrene, who wrote the hiſtory of Judas Maccabeus, and his brethren, and the wars againſt Antiochus Epiphanes, and Eupator his ſon. The ſecond book does not, by any means, equal the accuracy and excellency of the firſt. It contains a hiſtory of about fifteen years, from the execution of Heliodorus's commiſſion, who was ſent by Seleucus to fetch away the treaſures of the temple, to the victory obtained by Judas Maccabeus over Nicanor; that is, from the year of the world 3828, to the year 3843, 147 years before Chriſt.

MACE, *Macis*, the ſecond coat or covering of the nutmeg.

It is a thin and flat membranous ſubſtance, of an oleaginous nature, a yellowiſh colour, extremely fragrant, and of a pleaſant, but acrid and oleaginous taſte. It is to be choſen new, not dry, and of a fragrant ſmell, tough, oleaginous, and of a good yellow.

Mace is carminitive, ſtomachic, and aſtringent; it poſſeſſes all the virtues of the nutmeg, if taken in a larger doſe; and people have become delirious, for ſome hours, after an immoderate uſe of it. The oils of mace and nutmeg, whether prepared by diſtillation or by expreſſion, are ſo much of the ſame nature, that they may be indiſcriminately uſed for one another on all occaſions. They give eaſe in cholics, and often in nephritic caſes, taken internally from one drop to five or ſix of the diſtilled oil, or an unequal quantity of the expreſſed; and externally, they are of uſe to rub up paralytic limbs; they alſo aſſiſt digeſtion, and will often ſtop vomitings and hiccoughs, only by being rubbed on the regions of the ſtomach. The nurſes have a cuſtom of applying oil of mace, by expreſſion, to children's navels to eaſe their gripes, and that often with ſucceſs; and we are aſſured by authors of credit, that, rubbed on the temples, it promotes ſleep.

distance

The oils, by diſtillation, are very properly added to the ſtronger cathartics in form of pills, and prove excellent correctives.

MACERATION, *Maceratio*, in pharmacy, an infuſion or ſoaking of ingredients in water, &c. in order either to ſoften them, or extract their virtues. It is a kind of digeſtion.

MACHINE, *Machina*, in general, whatever hath force ſufficient to raiſe or ſtop the motion of a heavy body.

Machines are either ſimple or compound; the ſimple ones are the ſeven mechanical powers, viz. lever, balance, pully, axis and wheel, wedge, ſcrew, and inclined plane. See MECHANICAL POWERS, LEVER, BALANCE, &c.

If the given power is not able to overcome the given reſiſtance when directly applied, that is, when the power applied is leſs than the weight or reſiſtance given; then the thing is to be performed by the help of a machine made with levers, wheels, pullies, ſcrews, &c. ſo adjuſted, that when the weight and power are put in motion on the machine, the velocity of the power may be at leaſt ſo much greater than that of the weight, as the weight and friction of the machine, taken together, is greater than the power. For on this principle depends the mechaniſm or contrivance of mechanical engines uſed to draw or raiſe heavy bodies, or overcome any other force; the whole deſign of theſe being to give ſuch a velocity to the power in reſpect of the weight, as that the momentum of the power may exceed the momentum of the weight. For if machines are ſo contrived, that the velocity of the agent and reſiſtant are reciprocally as their forces, the agent will juſt ſuſtain the reſiſtant; but with a greater degree of velocity will overcome it. So that if the exceſs of velocity in the power is ſo great as to overcome all that reſiſtance which commonly ariſes from the friction or attrition of contiguous bodies, as they ſlide by one another, or from the coheſion of bodies that are to be ſeparated, or from the weights of bodies to be raiſed; the exceſs of the force remaining, after all theſe reſiſtances are overcome, will produce an acceleration of motion proportional thereto, as well in the parts of the machine, as in the reſiſting body.

MACHINERY, in epic and dramatic poetry, is when the poet introduces the uſe of machines, or brings ſome ſupernatural being upon the ſtage, in order to ſolve ſome difficulty, or to perform ſome exploit out of the reach of human power. The ancient dramatic poets never made uſe of machines, unleſs where there was an abſolute neceſſity for ſo doing; whence the precept of Horace,

Nec Deus interſit, niſi dignus vindice nodus inciderit.

It is quite otherwiſe with epic poets, who introduce machines in every part of their poems; ſo that nothing is done without the intervention of the gods. In Milton's Paradiſe Loſt, by far the greater part of the actors are ſupernatural perſonages: Homer and Virgil do nothing without them; and in Voltaire's Henriade, the poet has made excellent uſe of St. Louis.

As to the manner in which theſe machines ſhould act, it is ſometimes inviſibly, by ſimple inſpirations and ſuggeſtions; ſometimes by actually appearing under ſome human form; and, laſtly, by means of dreams and oracles, which partake of the other two. However, all theſe ſhould be ſo managed as to keep within the bounds of probability.

MACKREL, in ichthyology, a ſpecies of ſcomber, with five pinnules at the extremity of the back, and a ſpine at the anus.

MACROCOSM, the great world, or univerſe.

The word is Greek, *μακροκοσμος*, and derived from *μακρος*, great, and *κοσμος*, the world.

MACROLOGY, in rhetoric, a too copious ſtyle. See the article STYLE.

MACULÆ, in aſtronomy, dark ſpots appearing on the luminous faces of the ſun, moon, and even ſome of the planets; in which ſenſe they ſtand contradiſtinguiſhed from faculæ. See the article FACULÆ.

Theſe ſpots are moſt numerous and eaſily obſerved in the ſun. It is not uncommon to ſee them in various forms, magnitudes, and numbers, moving over the ſun's diſk. They were firſt of all diſcovered by the Lyncean aſtronomer Galileo, in the year 1610, ſoon after he had finiſhed his new invented teleſcope. That theſe ſpots adhere to, or float upon, the ſurface of the ſun, is evident for many reaſons. 1. Many of them are obſerved to break out near the middle of the ſun's diſk; others to decay and vaniſh there, or at ſome diſtance from his limb. 2. Their apparent velocities are always greateſt over the middle of the diſk, and gradually ſlower from thence on each ſide towards the limb. 3. The ſhape of the ſpots varies according to their poſition on the ſeveral parts of the diſk: thoſe which are round and broad in the middle, grow oblong and ſlender as they approach the limb, according as they ought to appear by the rules of optics.

By comparing many obſervations of the intervals of time in which the ſpots made their revolution, by Galileo, Caſſini, Scheiner, Hevelius, Dr. Halley, Dr. Derham, and others, it is found that 27 days, 12 hours, 20 minutes, is the meaſure of one of them at a mean; but in this time the earth deſcribes the angular motion of 26° 22′, about the ſun's center: therefore ſay, as the angular motion of 360°+26° 22′, is to 360°; ſo is 27 days, 12 hours, 20 minutes, to 25 days, 15 hours, 16 minutes; which, therefore, is the time of the ſun's revolution about its axis.

As to the magnitude of the ſpots, they are very conſiderable, as will appear if we obſerve that ſome of them are ſo large as to be plainly viſible to the naked eye; thus Galileo ſaw one of them in the year 1612; and Mr. Martin aſſures us, that he knew two gentlemen that thus viewed them within a few years paſt; whence he concludes, that theſe ſpots muſt therefore ſubtend, at leaſt, an angle of one minute. Now the diameter of the earth, if removed to the ſun, would ſubtend an angle of but $20''$; ſo that the diameter of a ſpot, juſt viſible to the naked eye, is, to the diameter of the earth, as 60 to 20, or as three to one; and, therefore, the ſurface of the ſpot, if circular, to a great circle of the earth, is as 9 to 1; but four great circles are equal to the earth's ſuperficies; whence the ſurface of the ſpot is, to the ſurface of the earth, as 9 to 4, or as $2\frac{1}{4}$ to 1. Gaſſandus ſays, he ſaw a ſpot whoſe diameter was equal to $\frac{1}{20}$ of that of the ſun, and therefore ſubtended an angle at the eye of $1' \, 3''$; its ſurface was therefore 5 times larger than the ſurface of the whole earth.

What theſe ſpots are, it is preſumed, no body can tell; but they ſeem to be rather thin ſubſtances than ſolid bodies, becauſe they loſe the appearance of ſolidity in going off the diſk of the ſun: they reſemble ſomething of the nature of ſcum or ſcoria, ſwimming on the ſurface, which are generated and diſſolved by cauſes little known to us: but whatever theſe ſolar ſpots are, it is certain they are produced from cauſes very inconſtant and irregular; for Scheiner ſays he frequently ſaw fifty at once, but for twenty years after ſcarce any appeared. And in this century the ſpots were very frequent and numerous till the year 1741, when, for three years ſucceſſively, very few appeared; and now, ſince the year 1744, they have again appeared as uſual.

Theſe maculæ are not peculiar to the ſun, they have been obſerved in all the planets. Thus Venus was obſerved to have ſeveral by ſignior Bianchini, in the year 1726. As in Venus, ſo in Mars, both dark and bright ſpots have been obſerved, firſt by Galileo, and afterwards by Caſſini, &c. Jupiter has had his ſpots obſervable ever ſince the invention and uſe of large teleſcopes. Saturn, by reaſon of his great diſtance on one hand, and Mercury, by reaſon of his ſmallneſs and vicinity to the ſun on the other, have not as yet had any ſpots diſcovered on their ſurfaces, and conſequently nothing in relation to their diurnal motions and inclinations of their axis to the planes of their orbits can be known, which circumſtances are determined in all the other planets, as well as in the ſun, by means of theſe maculæ. See the articles Venus, Mars, and Jupiter.

The ſpots, or maculæ, obſervable on the moon's ſurface, ſeem to be only cavities or large caverns, on which the ſun ſhining very obliquely, and touching only their upper edge with his light, the deeper places remain without light; but as the ſun riſes higher upon them, they receive more light, and the ſhadow, or dark parts grow ſmaller and ſhorter, till the ſun comes at laſt to ſhine directly upon them, and then the whole cavity will be illuſtrated: but the dark, duſky ſpots, which continue always the ſame, are ſuppoſed to proceed from a kind of matter or ſoil which reflects leſs light than that of the other regions. See Moon.

MAD-Apple, in botany. See the article Melongena.

MADWORT, *Alyſſon*, in botany. See the article Alysson.

MADDER, *Rubia*, in botany, a genus of plants, whoſe flower is monopetalous, campanulated, and divided into four ſegments; it hath four ſubulated filaments, which are ſhorter than the corolla; theſe are topped by ſimple antheræ. The fruit conſiſts of two ſmooth berries growing together, each containing a ſingle, roundiſh, umbilicated ſeed.

A ſpecies called Rubia tinctorum ſativa, is much cultivated in Holland, the root being neceſſary for the uſe of dyers and callico printers, and is ſo eſſential to both manufactures, as neither of thoſe buſineſſes can be carried on without this commodity; and the conſumption of it is ſo great here, as that upon a moderate computation, there is annually ſo much of it imported from Holland, as the price of it amounts to more than one hundred thouſand pounds, which might be ſaved to the public if a ſufficient quantity of it was planted in England, where it may be cultivated to greater advantage than in Holland, the land here being better adapted to grow this plant; but as the growing it in quantity has been for ſeveral years diſcontinued with us, ſo the method of culture is not well known to many perſons here; and as there is at preſent an inclination in the public to regain this loſt branch of trade, (for formerly there was not only enough of this commodity raiſed in England for our own conſumption, but alſo great quantities exported) and the great premiums offered by the Society for the Encouragement of Arts, Manufactures, and Commerce, to thoſe who raiſe the greateſt quantities of this uſeful plant, we ſhall therefore give a deſcription of the plant, and the method of culture, as practiſed in Holland.

The root is perennial, and compoſed of many long, thick, ſucculent fibres; theſe are joined at the top in a head, and is remarkable for its red colour and firm texture; it is ſomewhat tranſparent, and has a yellowiſh pith in the middle, which is tough, and of a bitteriſh taſte: from the root ariſes many four-cornered, jointed, annual ſtalks, which in good land will grow five or ſix feet long, and, if ſupported, ſometimes ſeven or eight; they are armed with ſhort herbaceous prickles, and at each joint are placed five or ſix ſpear-ſhaped leaves, that ſurround the ſtalk in form of a ſtar: from the joints of the ſtalks come out the branches which ſuſtain the flowers; they are placed oppoſite by pairs, each pair croſſing the other; theſe have a few ſmall leaves toward the bottom; the branches are terminated by looſe branching ſpikes of yellow flowers, theſe appear in June, and are ſometimes ſucceeded by ſeeds, which never ripen in England

The beſt madder is cultivated in Schowen, one of the iſlands of Zealand, which is performed in the following manner:

The land which is deſigned for madder, if it is ſtrong and heavy, is ploughed twice in autumn, that the froſt in winter may mellow it and break the clods, then it is ploughed again in the ſpring, juſt before the time of planting; but if the ground is light, then it is ploughed twice in the ſpring, at the laſt ploughing it is divided into lands of three feet broad, with furrows between each land four or five inches deep. Madder requires a loomy ſubſtantial ſoil, not too ſtiff and heavy, nor over light and ſandy. The time for planting madder begins toward the end of April, and continues all May, and ſometimes, in very backward ſprings, there is ſome planted the beginning of June. The young ſhoots from the ſides of the roots are taken off from the mother plant, with as much root as poſſible, and are planted with a dibber in rows at one foot aſunder, and commonly four in a row. The firſt year the madder is planted, it is cuſtomary to plant cabbages or dwarf kidney beans in the furrows between the beds; but there is always great care taken to keep the ground clear from weeds. In September or October, when the young madder is cleaned for the laſt time that ſeaſon, the green ſtalks are carefully ſpread down over the beds, without cutting off any part; and in November it is covered three or four inches with earth.

The ſecond year, in the beginning of April, which is about the time the young ſhoots ſpring forth, the earth on the top of the beds ſhould be ſcuffled over and raked, to deſtroy the young weeds, and make the ſurface ſmooth and mellow. The ſucceeding ſummer, there muſt be the ſame care taken to keep the madder clean, not admitting any other crop to be with it, and the ſucceeding autumn they muſt be earthed as before.

As madder-roots are ſeldom dug up the ſecond year, but after it has grown three ſummers, the culture of the laſt is the ſame as the former. In September it is dug up and carried to a ſtove to be dried; which being done ſufficiently, it is afterwards pounded, ſifted, and put in caſks.

When madder is thus prepared and caſked, it is, in Zealand, examined by ſworn eſſayers, and tried if it is not faulty packed up, that is, whether in preparing it is properly manufactured, and to ſee if every part of the caſk is filled with madder of equal goodneſs and quantity, not burned in drying, nor mixed with dirt.

In medicine, the root is attenuant, and has the credit of being a vulnerary of the firſt rank. It is given in chronical caſes, where there are obſtructions of the viſcera; and is good in the jaundice, dropſy, and obſtructions of the ſpleen; its doſe is from five grains to fifteen, but is ſeldom given ſingly. Madder has one very uncommon property, that is, it will turn the bones red of thoſe animals that have fed upon it ſome time.

MADNESS, *Mania*, a moſt dreadful kind of delirium without a fever.

Melancholy and madneſs may very juſtly be conſidered as diſeaſes nearly allied; for they have both the ſame origin, that is, an exceſſive congeſtion of blood in the brain: they only differ in degree, and with reſpect to the time of invaſion; melancholy being the primary diſeaſe, of which madneſs is the augmentation. Both theſe diſeaſes ſuppoſe a weakneſs of the brain, which may proceed from an hereditary diſpoſition; from violent diſorders of the mind, eſpecially long continued grief, ſadneſs, anxiety, dread, and terror; from cloſe ſtudy and intenſe application of mind to one ſubject; from narcotic and ſtupefying medicines; from previous diſeaſes, eſpecially acute fevers; from a ſuppreſſion of hæmorrhages, and omitting cuſtomary bleeding; from exceſſive cold, eſpecially of the lower parts, which forces the blood to the lungs, heart, and brain; and from violent anger, which will change melancholy into madneſs.

It is evident from obſervation, that the blood of maniac patients is black, and hotter than in the natural ſtate; that the ſerum ſeparates more ſlowly and in a leſs quantity than in healthy perſons; and that the excrements are hard, of a dark red or greyiſh colour, and the urine light and thin.

The antecedent ſigns of madneſs are a redneſs and ſuffuſion of the eyes with blood, a tremulous and inconſtant vibration of the eye-lids, a change of diſpoſition and behaviour; ſupercilious looks, a haughty carriage, diſdainful expreſſions, a grinding of the teeth, and unaccountable malice to particular perſons; alſo little ſleep, a violent head-ach, quickneſs of hearing, incredible ſtrength, inſenſibility of cold; and, in women, an accumulation of blood in the breaſts, in the increaſe of this diſorder.

Diſeaſes of the mind have ſomething in them ſo different from other diſorders, that they ſometimes remit for a long time, but return at certain periods, eſpecially about the ſolſtices. It may likewiſe be obſerved, that the raving fits of mad people, which keep the lunar periods, are generally accompanied with epileptic ſymptoms.

This diſeaſe, when it is primary or idiopathic, is worſe than the ſymptomatic, that accompanies the hyſteric or hypochondriac paſſion, which is eaſily cured; as is that alſo which ſucceeds intermitting fevers, a ſuppreſſion of the menſes, of the lochia, of the hæmorrhoids, or which is occaſioned by narcotics. When the paroxyſms are ſlight in the idiopathic kind, the cure is not very difficult; but if it is inveterate, and has but ſhort remiſſions, it is almoſt incurable. Sometimes this diſeaſe terminates by critical excretions of blood from the noſe, uterus, or anus; ſometimes diarrhœas and dyſenteries will terminate theſe diſorders; and puſtules, ulcers, and the itch, have alſo done the ſame. As to the cure, bleeding is the moſt efficacious of all remedies; and where there is a redundance of thick grumous blood, a vein is firſt to be opened in the foot, a few days after in the arm; then in the jugular vein, or one in the noſtrils with a ſtraw; and laſt of all the frontal vein, with a blunt lancet, for fear of hurting the pericranium. Tepid baths made of rain or river-water are alſo convenient; and before the patient enters the bath, he ſhould have cold water poured on his head. Purgatives are likewiſe uſeful; but the lenient are to be preferred to the draſtic: thus manna, caſſia, rhubarb, cream of tartar, or tartar vitriolate, are moſt convenient, when the diſeaſe ariſes from the hypochondriac paſſion, a a ſtagnation of the blood in the inteſtines, or in the ramifications of the vena portæ, eſpecially when taken in decoctions and infuſions at repeated intervals, ſo as to operate in an alterative manner. Some kinds of mineral waters are alſo highly efficacious in melancholy and madneſs: but nothing is better for removing the cauſe of theſe diſorders, than depurated mercury. Particular medicines among vegetables, are balm, betony, vervain, brook-lime, ſage, worm-blood, flowers of St. John's-wort, of the lime-tree, and camphire; from animals, aſs's blood; among minerals, ſteel, cinnabar, ſugar of lead, and the calx and tincture of ſilver. Hoffman is of opinion, that nothing better deſerves the name of a ſpecific in theſe diſeaſes than motion and exerciſe, when duly proportioned to the ſtrength of the body. Sadative medicines are good, but not opiates and narcotics, for theſe induce ſtupidity and folly: theſe that are good in an epilepſy, will be here beneficial, ſuch as caſtor, ſhavings of hartſhorn, the roots and ſeeds of piony, antiepileptic powders, the valerian root, flowers of the lily of the valley, and of the lime-tree. Boerhaave ſays, the principle remedy for raving madneſs is dipping in the ſea, and keeping the patient there as long as he can bear it. As a high degree of the itch has terminated theſe diſorders, it may be proper to make iſſues in the back; but bliſters, contrary to Shaw's opinion, are prejudicial; for by ſtimulating the nervous membranes and the dura mater, they increaſe the ſpaſmodic ſtricture, and the motion of the groſs and bilious blood through the head and the other parts of the body.

As to the diet, the patient ſhould carefully abſtain from ſalt and ſmoked fleſh, whether beef or pork; from ſhell fiſh; from fiſh of a heavy and noxious quality; from aliments prepared with onions and garlic: all which generate a thick blood. He ſhould, in general, eat no more than is ſufficient to ſupport nature. Small beer, or cold pure water, are the beſt drink; but ſweet and ſtrong wines are highly prejudicial, as is alſo exceſſive ſmoking tobacco. Change of air and travelling may be beneficial.

For the madneſs proceeding from the bite of a mad dog, ſee HYDROPHOBIA.

MADREPORA, in botany, a genus of ſubmarine plants, of a ſtony hardneſs, but ſomewhat approaching to the form of other vegetables: it is compoſed of a main ſtem, and ſubdivided into a number of branches, which are full of holes or pores, in a radiated form.

MADRIER, in the military art, a long and broad plank of wood, uſed for ſupporting the earth in mining and carrying on a ſap, and in making coffers, caponiers, galleries, and for many other uſes at a ſiege. Madriers are alſo uſed to cover the mouths of petards, after they are loaded, and are fixed with the petards to the gates or other places deſigned to be forced open.

MADRIGAL, in the Italian, Spaniſh, and French poetry, is a ſhort amorous poem, compoſed of a number of free and unequal verſes, neither confined to the regularity of a ſonnet, nor to the point of an epigram, but only conſiſting of ſome tender and delicate thought, expreſſed with a beautiful, noble, and elegant ſimplicity. The madrigal is uſually conſidered as the ſhorteſt of all the leſſer kinds of poetry, except the epigram: it will admit of fewer verſes than either the ſonnet or the roundelay; no other rule is regarded in mingling the rhimes, and the different kinds of verſe, but the fancy and convenience of the author: however, this poem allows of leſs licenſe than many others, both with reſpect to rhime, meaſure, and delicacy of expreſſion.

MÆMACTERION, μαιμακτηριων, in ancient chronology, the fourth month of the Athenian year, conſiſting of only twenty-nine days, and anſwering to the latter part of September and the beginning of October.

MAGAS, in ancient muſic, the name of two inſtruments, the one a ſtringed kind, and the other a kind of flute, which is ſaid to have yielded very high and very low ſounds at the ſame time.

MAGAS alſo ſignifies the bridge of any inſtrument.

MAGAZINE, a place in which ſtores are kept of arms, ammunition, proviſions, &c. Every fortified town ought to be furniſhed with a large magazine, which ſhould contain ſtores of all kinds, ſufficient to enable the garriſon and inhabitants to hold out a long ſiege, and in which ſmiths, carpenters, wheelwrights, &c. may be employed in making every thing belonging to the artillery, as carriages, waggons, &c.

MAGAZINE *of a Ship of War*, a ſmall ſtorehouſe in the after or fore part of a ſhip's hold, where the gun-powder is ſtowed, and filled into cartridges, bombs, grenadoes, &c. by the gunner and his mates, ready for engagement.

MAGDALEN, or *Nuns of St.* MAGDALEN, an order of religious in the Romiſh church, dedicated to St. Mary Magdalen, and ſometimes called Magdalenettes. Theſe chiefly conſiſt of courtezans, who quitting their profeſſion, devote the reſt of their lives to repentance and mortification.

MAGI, or MAGIANS, an ancient religious ſect in Perſia, and other eaſtern countries, who maintained, that there were two principles, the one the cauſe of all good, the other the cauſe of all evil; and abominating the adoration of images, worſhiped God only by fire, which they looked upon as the brighteſt and moſt glorious ſymbol of Oromaſdes, or the good god; as darkneſs is the trueſt ſymbol of Arimanius, or the evil god. This religion was reformed by Zoroaſter, who maintained that there was one ſupreme independant Being; and under him two principles or angels, one the angel of goodneſs and light, and the other of evil and darkneſs; that there is a perpetual ſtruggle between them, which ſhall laſt to the end of the world; that then the angel of darkneſs and his diſciples ſhall go into a world of their own, where they ſhall be puniſhed in everlaſting darkneſs; and the angel of light and his diſciples ſhall alſo go into a world of their own, where they ſhall be rewarded in everlaſting light.

The prieſts of the magi, were the moſt ſkilful mathematicians and philoſophers of the ages in which they lived, inſomuch, that a learned man and magian became equivalent terms. The vulgar looked on their knowledge as more than natural, and imagined them inſpired by ſome ſupernatural power; and hence, thoſe who practiſed wicked and miſchievous arts, taking upon themſelves the name of magians, drew on it that ill ſignification which the word magician now bears among us.

This ſect ſtill ſubſiſts in Perſia, under the denomination of Gaurs, where they watch the ſacred fire with the greateſt care, and never ſuffer it to be extinguiſhed. See the article GAURS.

MAGIC, originally ſignified only the knowledge of the more ſublime parts of philoſophy; but as the magi likewiſe profeſſed aſtrology, divination, and ſorcery, the term magic became odious, being uſed to ſignify an unlawful diabolical kind of ſcience, acquired by the aſſiſtance of the devil and departed ſouls.

Natural magic is only the application of natural philoſophy to the production of ſurpriſing, but yet natural affects. The common natural magic, found in books, gives us only ſome childiſh and ſuperſtitious traditions of the ſympathies and antipathies of things, or of their occult and peculiar properties, which are uſually intermixed with many trifling experiments, admired rather for their diſguiſe than for themſelves. See EXPERIMENTAL PHILOSOPHY.

MAGIC *Square*, a ſquare figure formed of a ſeries of numbers in arithmetical progreſſion, diſpoſed into ſuch parallel and equal ranks, as that the ſums of each row, as well diagonally as laterally, ſhall be equal.

MAGISTERY, in chemiſtry, commonly denotes a white powder, prepared of certain ſubſtances by precipitation. Theſe ſubſtances are either of the mineral kind, as earth, ſtones, &c. or vegetables, as herbs, reſins, &c. or animals, as bones, horns, and cruſtaceous parts.

The method of preparing it is thus: take the ſubſtance from which you deſign to prepare the magiſtery, and bruiſe or break it groſly; then pour thereon a proper liquor, an acid, &c. in order to its ſolution or extraction. The ſolution is precipitated by an affuſion of the liquor, or by the matter by whoſe force that of the ſolvent is blunted: the precipitated powder may be waſhed, if neceſſary, with common water, and afterwards gently dried.

MAGISTERY *of Biſmuth*, is made by diſſolving biſmuth in ſpirit of nitre, and pouring on it ſalt water, which precipitates the magiſtery to the bottom.

MAGISTERY *of Lead*, is made by diſſolving ſaccharum ſaturni in diſtilled vinegar, and then precipitating it with oil of tartar per deliquium.

MAGISTERY *of Reſins*, or reſinous extracts of ſcammony, jalap, &c. are made by diſſolving the matter in ſpirit of wine, and precipitating it with water.

Mr. Boyle takes magiſtery to conſiſt in a preparation of a body, whereby it is converted, by means of ſome additament, into a body of a different kind, as when iron or copper is turned into cryſtals of Mars and Venus.

MAGISTRATE, any public officer to whom the executive power of the law is committed, either wholly, or in part.

MAGNA CHARTA, the great charter of the liberties of England, and the baſis of our laws and privileges.

This charter may be ſaid to derive its origin from king Edward the Confeſſor, who granted ſeveral privileges to the church and ſtate, by charter: theſe liberties and privileges were alſo granted and confirmed by king Henry I. by a celebrated great charter, now loſt; but which was confirmed or reenacted by king Henry II. and king John. Henry III. the ſucceſſor of this laſt prince, after having cauſed twelve men to make enquiry into the liberties of England in the reign of Henry I. granted a new charter, which was the ſame as the preſent magna charta; this he ſeveral times confirmed, and as often broke; till in the thirty-ſeventh year of his reign, he went to Weſtminſter-hall, and there, in the preſence of the nobility and biſhops, who held lighted candles in their hands, magna charta was read, the king all the while holding his hand to his breaſt, and at laſt ſolemnly ſwearing faithfully and inviolably to obſerve all the things therein contained, &c. then the biſhops extinguiſhing the candles, and throwing them on the ground, they all cried out, "Thus let him be extinguiſhed, and ſtink in hell, who violates this charter." It is obſerved, notwithſtanding the ſolemnity of this confirmation, king Henry, the very next year, again invaded the rights of his people, till the barons entered into a war againſt him, when, after various ſucceſs, he confirmed this charter, and the charter of the foreſt, in the fifty-ſecond year of his reign. This excellent charter, ſo equitable and beneficial to the ſubject, is the moſt ancient written law in the kingdom: by 25 Edw. I. it is ordained, that it ſhall be taken as the common law; and by 43 Edw. III. all ſtatutes made againſt it are declared to be void.

MAGNESIA, or MANGANESE, in natural hiſtory. See MANGANESE.

MAGNESIA ALBA, in the materia medica, a fine white earth, ſoluble readily in all acids, the vitriolic as well as the others, into a bitter purgative liquor; and not convertible by fire into quicklime.

This earth has not hitherto been found naturally pure or in a ſeparate ſtate: it was for ſeveral years a celebrated ſecret in the hands of ſome particular perſons abroad, till its preparation was made public by Lanciſi in the year 1717, and afterwards by Hoffman in 1722. It was then extracted from the mother-ley, or the liquor which remains after the cryſtallization, of rough nitre; either by precipitation with a ſolution of fixed alkaline ſalt; or by evaporating the liquor, and calcining the dry reſiduum, ſo as to diſſipate the acids, by which the earth had been made diſſoluble.

The magneſia, in this mother-ley, appears to have proceeded from the vegetable aſhes, which are either made ingredients in the compoſitions from which nitre is obtained, or elſe added to the elixation of the nitre: for the aſhes of different woods, burnt to perfect whiteneſs, and freed from their alcaline ſalt, were found to be of the ſame nature with the true magneſia. But as quick-lime alſo, in moſt of the German, French, and other European nitre-works, is commonly employed in large quantity, the earth obtained from the mother-leys of thoſe works is rather a calcareous earth than magneſia. What is now brought from abroad, under the name of magneſia, gives plain proof of its calcarious nature, by its burning into quick-lime, and forming a ſelenites with the vitriolic acid.

The true magneſia is obtained in great purity, from a filtered ſolution of ſal catharticus amarus; by adding a filtered ſolution of any alcaline ſalt, till a freſh addition produces no farther milkineſs. The white earth, which precipitates, is to be waſhed by repeated affuſions of hot as well as cold water, and then dried for uſe.

The magneſia is recommended by Hoffman as an uſeful antaced, a ſafe and inoffenſive laxative in doſes of a dram or two, and a diaphoretic and diuretic, when given in ſmaller doſes, as fifteen or twenty grains. Since this time, it has of late come into great eſteem among us, particularly in heart-burns, and for preventing or removing the many diſorders which children are thrown into from a redundance of acid humours in the firſt paſſages. It is preferred, on account of its laxative quality, to the teſtaceous and other abſorbent earths, which, unleſs gentle purgatives are given occaſionally to carry them off, are apt to lodge in the body, and occaſion a coſtiveneſs very detrimental to infants. It muſt be obſerved, however, that it is not the magneſia itſelf which proves laxative, but the ſaline compound reſulting from its coalition with acids: if there are no acid juices in the ſtomach to diſſolve it, it has no ſenſible operation, and in ſuch caſes it may be rendered purgative by drinking any kind of acidulous liquors after it. All the other known ſoluble earths yield with acids, not purgative, but more or leſs aſtringent compounds.

MAGNET, *Magnes*, loadſtone, in natural hiſtory, a very rich iron ore, found in large detached maſſes, of a duſky iron grey, often tinged with browniſh or reddiſh, and when broken appearing ſomething like the common emery, but leſs ſparkling. It is very heavy, conſiderably hard, of a perfectly irregular and uneven ſurface, and of a firm ſtructure, but uſually with ſome porous irregularities within. It is found in England, and all other places where there are iron mines.

The word is derived from a city in Lydia, called Magneſia, where this ſtone was firſt found.

This famous ſtone was well known to the ancients, but ſcarce any other property of it than that of its attracting iron, as we may ſee in Pliny, B. 36. c. 16. However, it appears, that they knew ſomething of its communicating virtue, particularly Plato, when deſcribing that famous chain of iron rings put together, the firſt of which was held by a magnet; and Lucretius makes mention of the ſame magnetic quality operating through the hardeſt bodies.

But we do not ſee by any paſſage in their writings, that they knew any thing of the directive virtue of the loadſtone: and we are utterly in the dark as to the time this diſcovery was firſt made, as alſo when it was applied to the uſe of navigation. It, however, appears, that this diſcovery was made before the year one thouſand one hundred and eighty.

The primary properties of the loadſtone are the following: 1. Every loadſtone has two points, called poles, which emit the magnetic virtue. 2. One of theſe poles attracts, the other repels iron, but no other body. 3. This virtue, being the third ſpecies of attraction, is communicated to iron very copiouſly by the touch, which renders it ſtrongly magnetic. 4. A piece of iron ſo touched by the loadſtone, and nicely ſuſpended on a ſharp point, will be determined to ſettle itſelf in a direction nearly north and ſouth. 5. The end of the needle touched by the ſouth pole of the ſtone, will point northwards; and the contrary. 6. Needles touched by the ſtone, will dip below the horizon, or be directed on the touched part to a point within the earth's ſurface: this is called the dipping needle. 7. This virtue may alſo be communicated to iron by a ſtrong attrition all one way. 8. Iron rods or bars acquire a magnetic virtue by ſtanding long in one poſition. 9. Fire totally deſtroys this virtue, by making the ſtone or iron red hot. 10. This power is exerted ſenſibly to the diſtance of ſeveral feet. 11. It is ſenſibly continued through the ſubſtance of ſeveral contiguous bodies or pieces of iron. 12. It pervades the pores of the hardeſt body. And, 13. equally attracts the iron in vacuo as in open air. Theſe and many more are the properties of a body, not more wonderful than uſeful to mankind. See the articles POLE, NEEDLE, VARIATION, &c.

The cauſe of the variation of the needle has remained hitherto without any demonſtative diſcovery; yet ſince its declination, and inclination, or dipping, do both of them manifeſtly indicate the cauſe to be ſomewhere in the earth, it has given occaſion to philoſophy to frame hypotheſes for a ſolution, which makes the earth a large or general magnet or loadſtone, of which all the leſſer ones are but ſo many parts or fragments, and being poſſeſſed of the ſame virtue, will, when left to move freely, have the ſame diſpoſition and ſimilarity of poſition, and other circumſtances.

The moſt conſiderable of theſe hypotheſes is that of the late ſagacious Dr. Halley, which is this: the globe of the earth is one great magnet, having four magnetical poles or points of attraction, near each pole of the equator two; and that in thoſe parts of the world which lie near adjacent to any one of thoſe magnetical poles, the needle is chiefly governed thereby, the neareſt pole being always predominant over the more remote one. Of the north poles, that which is neareſt to us he ſuppoſes to be in the meridian of the land's end, which governs the variations in European Tartary and the North Sea; the other he places is a meridian paſſing through California, about 15 degrees from the north pole of the world, which governs the needle in North America, and the oceans on either ſide. In like manner he accounts for the variations in the ſouthern hemiſphere. See Philoſophical Tranſactions, N°. 148.

The variation of the needle from the north and ſouth points of the horizon not being the ſame, but variable in different years, and in a diverſe manner, in different parts of the earth, made the doctor farther conjecture, that two of the magnetic poles were fixed, and two moveable; and in order to make this out, he ſuppoſes the external part of the earth to be a ſhell or cortex, containing within it a magnetic moveable nucleus of a globular form, whoſe center of gravity is the ſame with that of the earth, and moveable about the ſame axis.

Now, if the motions of both the ſhell and nucleus were the ſame, the poles of each would always have the ſame poſition to each other; but he ſuppoſes the motion of the nucleus to be a very ſmall matter leſs than that of the ſhell, which yet is ſcarce ſenſible in 365 revolutions; and, if ſo, the magnetic poles of the nucleus will by ſlow degrees change their diſtance from the magnetic poles of the ſhell, and thus cauſe a variation in that needle's variation, which is governed by the moveable pole of the nucleus, while that variation which reſpects the fixed poles of the magnetic ſhell remains more conſtant; as in Hudſon's-bay the change is not obſerved to be near ſo faſt as in theſe parts of Europe.

The variation of the needle has, within a century paſt, undergone a remarkable alteration; for at London it was obſerved by Mr. Burrows, in the year 1580, to be 11° 15′ eaſt: after that, in the year 1622, it was obſerved by Mr. Gunter to be but 6° eaſt. In the year 1634, Mr. Gellibrand obſerved it to be 4° 5′ eaſt. In 1657, it was obſerved by Mr. Bond to be nothing at all, that is, the needle pointed directly to the north. After this, in the year 1672, Dr. Halley obſerved it to be 2° 30′ weſtward; and again, in the year 1692, he found it 6° weſt. Since then, in the year 1722, Mr. Graham, by moſt accurate experiments, found it to be 14° 13′, and at preſent it is between 19 and 20 degrees; and in ſome places it has been found to be 23° weſtward.

The ingenious Muſchenbroek has, with indefatigable pains and application, made experiments of the attractions and repulſions of loadſtones in reſpect to iron and to each other, but could never find any regular proportion in the increaſe of attraction in their approach to, or decreaſe of attraction in their receſs from, one another; only that the force of the magnetic virtue did increaſe in the approach to, and diminiſh in the receſs from, the ſtone, but not exactly as the diſtance, nor as the ſquare or cube of the diſtance, nor as the ſquare or cube of the diſtance reciprocally, nor in any proportion reducible to numbers; and therefore he very reaſonably conjectures, that the repulſions and attractions diſturb one another, ſo as to confound the proportion; nor are we able to hope for any other rule concerning this matter, till a way be found, if ever it can be, of ſeparating the attracting from the repelling parts.

The poles of a loadſtone are not to be looked upon as two ſuch invariable points as never to change place; for according to Mr. Boyle, the poles of a little bit of magnet may be changed by applying them to the more vigorous poles of another, as has been confirmed by Dr. Knight, who can change at pleaſure the poles of a natural magnet, by means of iron bars magnetically impregnated. Upon gently cutting a magnet through the middle of its axis, each piece becomes a compleat magnet; for the parts that were contiguous under the equator before the magnet was cut, become poles, and even poles of different names; ſo that each piece may become equally a north or ſouth-pole, according as the ſection was made nearer the ſouth or north-pole of the large magnet; and the ſame thing would happen in any other ſub-diviſions. But upon cutting a magnet longitudinally, there will then be four poles, the ſame as before the cutting; only that there ſhall be formed in each piece a new axis parallel to the former, and more or leſs in the inſide of the magnet. We find by experience, that two magnets attract each other by the poles of different denominations; whereas, on the contrary, the two ſimilar poles repel each other.

By a great number of experiments we alſo learn that the force of a magnet in attraction and repulſion reaches ſometimes farther, ſometimes not ſo far. The activity of ſome reaches to 14 feet, and that of others is inſenſible within 8 or 9 inches; the ſphere of activity is greater on certain days than on others, without its ever appearing that the heat, moiſture, or drought of the air contribute any thing to this effect.

No ſolid or fluid body can any way hinder the mutual action of iron and a magnet upon each other, unleſs it be iron itſelf: nor does the exceſſive heat of iron diminiſh theſe effects, though the exceſſive heat of a magnet diminiſh its virtue, at leaſt for a time.

The attraction of a magnet newly dug out of a mine, makes it to take up only very ſmall pieces of iron; for which reaſon it muſt be armed in order to augment its force: beſides this, the arming it unites, directs, and condenſes its virtue towards its poles, and cauſes its emanations to tend entirely towards the maſs which is laid thereon.

When you have determined where the poles are, which you may exactly find by placing over the magnet a very fine ſhort needle, which will ſtand perpendicular over each pole, and no where elſe; then you muſt file it very ſmooth at its poles, ſo that the axis ſhall have the greateſt length, yet without too much diminiſhing its other dimenſions. To determine the proportions of the armour, the greater the force of the magnet is, the thicker muſt the pieces of ſteel be of which it is to conſiſt; and for this purpoſe try the magnet with ſeveral ſteel-bars, and the greater weigh it takes up with a ſteel-bar on, that bar is to be its armour. Though the attraction of an armed magnet appears conſiderable, yet very weak cauſes deſtroy its effect in a moment; for inſtance, when an oblong piece of iron is attracted under the pole of an excellent magnet, and the pole of a different denomination in another magnet that is weaker is preſented to the lower end of this piece of iron, this weaker magnet will very ſtrongly take away the iron. In like manner, if the point of a needle be put under one of the poles of a magnet ſo as to hang by its head, and preſent to this head any bar of iron by its upper end, the needle will immediately quit the magnet, in order to adhere to the bar; but if the needle hold by its head to the pole of the magnet, then neither the bar of iron nor a weak magnet ſhall diſengage it; and there is another ſlight circumſtance which makes an armed and vigorous loadſtone appear to have no more force, and that is the two great length of the iron which is to be raiſed by one of the poles.

In order to communicate the magnetic virtue effectually, theſe methods are made uſe of: 1. It has been diſcovered that iron rubbed upon one of the poles of the magnet, acquires a great deal more virtue than from any other part thereof, and this is more conſiderable from an armed than a naked magnet. 2. The more gently the iron is preſſed, and the more it is preſſed againſt the pole, the more magnetical it becomes. 3. It is more convenient to impregnate iron on one pole than on both ſucceſſively. 4. The iron is much better impregnated by preſſing it uniformly, and in the ſame direction, according to its length, than by rubbing it by the middle; and the extremity which touches the pole laſt, retains the moſt virtue. 5. A piece of poliſhed ſteel, or a bit of pointed iron, receives more virtue than a ſimple piece of iron of the ſame figure; and, *cæteris paribus*, a piece of iron that is long, ſmall and pointed, is more ſtrongly impregnated than that of any other form.

The communication of the magnetic virtue does not ſenſibly impair that of the loadſtone; though it has been obſerved that ſome magnets have communicated a greater power to iron to raiſe weights, than they had themſelves, but without impairing their own force, or adding any thing to the weight of the iron.

As ſeveral ways have been propoſed for recovering the decayed virtue of loadſtones, but to little purpoſe, eſpecially that of keeping the ſtone conſtantly in ſteel filings, we ſhall here relate the remarkable experiment of Mr. Haac for this purpoſe, as it was attended with great ſucceſs. This gentleman had a magnet weighing fourteen ounces and a half, armed, which would take up ſixteen times its own weight; but having laid it by for ſome years unuſed, it loſt one fourth part of its virtue, or more; whereupon he hung as much weight to the ſtone as it would ſuſtain, and ſo left it for ſome weeks; then returning, he applied more weight to the former, which it very eaſily bore, and then repeating the addition of more weight at ſeveral periods, in the ſpace of about two years, he found that the ſtone had not only recovered its former ſtrength, but increaſed it ſo far, that it would now take up more than twenty pounds, whereas at firſt it would not take up fifteen.

Artificial MAGNET, a ſteel bar impregnated with the virtues of the magnet, ſo as to poſſeſs all the properties, and be uſed inſtead of the natural loadſtone.

There have been ſeveral methods propoſed for making artificial magnets, but none has yet met with greater ſucceſs than that of Mr. Canton's a gentleman well known in the learned world, and to whom we owe this diſcovery.

Procure a dozen of bars, ſix of ſoft ſteel, each three inches long, one quarter of an inch broad, and one twentieth of an inch thick; with two pieces of iron, each half the length of one of the bars, but of the ſame breadth and thickneſs: alſo ſix pieces of hard ſteel, each five inches and a half long, half an inch broad and three twentieths of an inch thick; with two pieces of iron, of half the length, but the whole breadth and thickneſs of one of the hard bars; and let all the bars be marked with a line quite round them at one end. Then take an iron poker and tongs, (pl. LXIX. *fig.* 3.) or two bars of iron, the larger they are, and the longer they have been uſed, the better; and fixing the poker upright between the knees, hold to it, near the top, one of the ſoft bars, having its marked end downwards, by a piece of ſewing ſilk, which muſt be pulled tight by the left-hand, that the bar may not ſlide: then graſping the tongs with the right hand, a little below the middle, and holding them nearly in a vertical poſition, let the bar be ſtroked by the lower end from the bottom to the top, about ten times on each ſide, which will give it a magnetic power ſufficient to lift a ſmall key at the marked end; which end, if the bar was ſuſpended on a point, would turn towards the north, and is therefore called the north pole, and the unmarked end is, for the ſame reaſon, called the ſouth pole. Four of the ſoft bars being impregnated after this manner, lay the two (*fig.* 1.) parallel to each other, at the diſtance of one fourth of an inch, between the two pieces of iron belonging to them, a north and a ſouth pole againſt each piece of iron: then take two of the four bars already made magnetical, and place them together ſo as to make a double bar in thickneſs, the north pole of one even with the ſouth pole of the other; and the remaining two being put to theſe, one on each ſide, ſo as to have two north and two ſouth poles together; ſeparate the north from the ſouth poles at one end by a large pin, and place them perpendicularly with that end downward on the middle of one of the parallel bars, the two north poles towards its ſouth, and the two ſouth poles towards its north end: ſlide them backward and forward three or four times the whole length of the bar, and removing them from the middle of this, place them on the middle of the other bar as before directed, and go over that in the ſame manner; then turn both the bars the other ſide upwards, and repeat the former operation: this being done, take the two from between the pieces of iron, and placing the two outermoſt of the touching bars in their room, let the other two be the outermoſt of the four to touch theſe with; and this proceſs being repeated till each pair of bars have been touched three or four times over, which will give them a conſiderable magnetic power, put the half dozen together after the manner of the four, (*fig.* 2.) and touch with them two pair of the hard bars placed between their irons, at the diſtance of about half an inch from each other; then lay the ſoft bars aſide, and with the four hard ones, let the other two be impregnated, (*fig.* 5.) holding the touching bars apart at the lower end near two tenths of an inch, to which diſtance let them be ſeparated after they are ſet on the parallel bar, and brought together again before they are taken off; this being obſerved, proceed according to the method deſcribed above, till each pair have been touched two or three times over; but as this vertical way of touching a bar will not give it quite ſo much of the magnetic virtue as it will receive, let each pair be now touched once or twice over in their parallel poſition between the irons, (*fig.* 6.) with two of the bars held horizontally, or nearly ſo, by drawing at the ſame time the north of one from the middle over the ſouth end, and the ſouth of the other from the middle over the north end of a parallel bar; then bringing them to the middle again, without touching the parallel bar, give three or four of theſe horizontal ſtrokes to each ſide. The horizontal touch, after the vertical, will make the bars as ſtrong as they poſſibly can be made, as appears by their not receiving any additional ſtrength, when the vertical touch is given by a great number of bars, and the horizontal by thoſe of a ſuperior magnetic power. This whole proceſs may be gone through in about half an hour; and each of the large bars, if well hardened, may be made to lift twenty-eight troy ounces, and ſometimes more. And when theſe bars are thus impregnated, they give to an hard bar of the ſame ſize its full virtue in leſs than two minutes; and therefore will anſwer all the purpoſes of magnetiſm in navigation and experimental philoſophy much better than the loadſtone, which is known not to have a ſufficient power to impregnate hard bars. The half dozen being put into a caſe (*fig.* 4.) in ſuch a manner as that two poles of the ſame denomination may not be together, and their irons with them as one bar, they will retain the virtues they have received: but if their power ſhould, by making experiments, be ever ſo far impaired, it may be reſtored without any foreign aſſiſtance in a few minutes. And if, out of curioſity, a much larger ſet of bars ſhould be required, theſe will communicate to them a ſufficient power to proceed with, and they may in a ſhort time, by the ſame method, be brought to their full ſtrength.

MAGNIFYING, in philoſophy, the making of objects appear larger than they would otherwiſe do; whence convex lenſes, which have the power of doing this, are called magnifying glaſſes; and of ſuch glaſſes are microſcopes conſtructed. See LENS and MICROSCOPE.

MAGNITUDE, whatever is made of parts locally extended, or that hath ſeveral dimenſions; as a line, ſurface, ſolid, &c. See the article LINE, &c.

The apparent magnitude of a body is that meaſured by the viſual angle, formed by rays drawn from its extremes to the center of the eye; ſo that whatever things are ſeen under the ſame or equal angles, appear equal; and *vice verſa*.

MAGNOLIA, the laurel-leaved tulip-tree, in botany, a genus of plants, whoſe flower corolla conſiſts of nine oblong, obtuſe, and concave petals; the filaments are ſhort, acuminated, and numerous, terminated by linear antheræ adhering to every ſide of the filaments. The fruit is an oval ſtrobilus, compoſed of compreſſed, roundiſh, and almoſt imbricated capſules, which are unilocular, and contain a kidney ſhaped ſeed. All the ſpecies of magnolia are natives of Carolina, Virginia, or Florida, they are propagated by ſeeds, which ſhould be procured from where they grow naturally, and on their arrival ſhould be ſown immediately on a moderated hot bed, they may alſo be raiſed from layers; and could theſe beautiful trees be ſo far naturalized to our climate as to endure the ſeverity of our coldeſt winters, they would make ſome of the greateſt ornaments of our gardens.

MAHOMETANS, thoſe who believe and practiſe the religion of Mahomet.

The fundamental poſition on which Mahomet erected the ſuperſtructure of his religion, was, that there has been from the beginning of the world but one true orthodox belief, which conſiſts in acknowledging one only true God, and obeying ſuch of his meſſengers and prophets as he has from time to time ſent into the world, to reveal his will to mankind. Upon this foundation he ſat up for a prophet to extirpate idolatry, which was the religion of the Arabs, his countrymen, and to reform the other abuſes crept into religion. The whole ſubſtance of his doctrine he therefore comprehended in theſe two principal articles of faith, "There is "but one God, and Mahomet is his prophet;" in conſequence of which laſt article, all ſuch ordinances and inſtitutions as he thought fit to eſtabliſh, were to be received as obligatory and of divine authority.

The Mahometans divide their religion into two general parts, faith and practice; of which the firſt is divided into ſix diſtinct branches; belief in God, in his angels, in his ſcriptures, in his prophets, in the reſurrection and final judgment, and in God's abſolute decrees. The points relating to practice are, prayer, with waſhings, &c. alms, faſting, pilgrimage to Mecca, and circumciſion. In regard to theſe practical points, Mahomet, it is ſaid, declared, that the practice of religion is founded upon cleanlineſs, which is one half of faith, and the key of prayer. Alms-giving is thought to be ſo pleaſing in the ſight of God, that the caliph Omar Ebn Abdalaziz uſed to ſay, prayer carries us half way to God; faſting brings us to the door of his palace; and alms procure us admiſſion: and Mahomet himſelf uſed to ſay of faſting, that it was the gate of religion; and the odour of the mouth of him who faſteth is more grateful to God than that of muſk. Beſides theſe they have ſome negative precepts and inſtitutions of the koran, in which ſeveral things are prohibited, as uſury, the drinking of wine, all games that depend upon chance, the eating of blood, and ſwine's fleſh, and whatever dies of itſelf, is ſtrangled, or is killed by a blow or by another beaſt. Theſe doctrines and practices Mahomet eſtabliſhed by the ſword, by preaching, and by the alkoran or koran, which contains the principles of his religion; and he and his followers met with ſuch ſucceſs, as in a few years to ſubdue half the known world. See ALCORAN.

MAIDEN, an inſtrument uſed in Scotland for beheading of criminals.

This is a broad piece of iron about a foot ſquare, very ſharp on the lower part, and loaded above with a very heavy weight of lead. At the time of execution, it is pulled up to the top of a narrow wooden frame, about ten feet high, and as broad as the engine, with mouldings on each ſide for the maiden to ſlide in. A convenience is made about four feet from the ground, for the priſoner to lay his neck; and there is a kind of bar ſo faſtened as to keep him from ſtirring. The priſoner being thus ſecured, and the ſign given, the maiden is let looſe, which in a moment ſeparate his head from his body.

MAIDEN-ASSIZE, an aſſize in which no perſon is condemned to die.

MAIDEN-HAIR, *Adiantum*, in botany, a genus of cryptogamious plants, producing no viſible flowers; the ſeeds are a fine duſt, lying in oval ſpots about the edges of the backs of the leaves, which curl over and cover them. As the leaves of all the ſpecies of maiden-hair have one general appearance, it is eaſy to diſtinguiſh them from the other plants of the fern kind; the leaves of all the maiden hairs have a ſlight ſweetiſh roughiſh taſte, and a pleaſant but weak ſmell, very perceptible when boiling water is poured on them. This plant has long been held in eſteem againſt diſorders of the breaſt, for promoting expectoration, ſoftening recent coughs, and allaying the tickling in the throat, occaſioned by defluxions of the rheum; for theſe purpoſes a ſyrup of the true ſort, flavoured with a little orange flower water, has been uſually brought from France, and a ſyrup of the ſpecies which grows in Canada made with maple ſugar is ſomtimes received from America. The virtue of maiden-hair is obtainable however to much better advantage by drinking an infuſion of the herb as tea, ſweetened either with ſugar, or by the addition of a little liquorice. The Engliſh maiden-hair has been commonly ſubſtituted in the pectoral ſyrups and infuſions made among us; the Canada ſpecies, which appears to be ſuperior to the others is ſaid to have been long made uſe of in France, and has lately been introduced into practice in this country.

MAJESTY, a title given to kings, which frequently ſerves as a term of diſtinction.

MAIL, or *Coat of* MAIL, a piece of defenſive armour for the body, made of ſmall iron rings, interwoven in the manner of a net.

MAIM, MAIHEM, or MAYHEM, in law, a wound, by which a perſon loſes the uſe of a member that might have been a defence to him.

MAIN, in the ſea language, chief, principal, as the main-maſt, main-yard, main-ſail, main-hatchway, &c.

MAIN alſo implies ſome continent or great land, as oppoſed to iſland: We ſteered between the iſland and the main.

MAIN-BOWLINES. See BOWLINES.
MAIN-BRACES. See BRACES.
MAIN-HATCHWAY. See HATCHWAY.
MAIN-JEARS. See JEARS.
MAIN-LIFTS. See LIFTS.
MAIN-MAST. See MAST.
MAIN-SAIL. See SAIL.
MAIN-SHROUDS. See SHROUDS
MAIN-TYE. See TYE.
MAIN-YARD. See YARD.

MAINPRISE, in law, is the receiving a perſon into friendly cuſtody, who might otherwiſe be committed to priſon, on ſecurity given that he ſhall be forth-coming at a certain time and place appointed. There is a difference between bail and mainpriſe, for a perſon mainpriſed is ſaid to be at large from the day of his being mainpriſed, till the day of his appearance, and is not liable to be confined by his ſureties: but when a perſon is let to bail by a judge, &c. till a certain day, he is in law always accounted in the ward of his bail during the time, and they may, if they pleaſe, keep him in priſon.

MAINTENANCE, in law, is an unlawful maintaining or ſupporting a ſuit between others, by ſtirring up quarrels, or interfering in a cauſe in which the perſon has no concern.

MAJOR, in the art of war, the name of ſeveral officers of very different ranks and functions; as, 1. Major-general, the next officer to the lieutenant-general: his chief buſineſs is to receive the orders from the general, or in his abſence from the lieutenant-general of the day; which he is to diſtribute to the brigade-majors, with whom he is to regulate the guards, convoys, and detachments. When there are two attacks at a ſiege, he commands that on the left. He ought to be well acquainted with the ſtrength of each brigade, of each regiment in particular, and to have a liſt of all the field officers. In ſhort, he is in the army what a major is in a regiment. He is allowed an aid-de-camp, and has a ſerjeant and fifteen men for his guard. 2. Major of a brigade, the officer who receives the orders from the major-general, and delivers them to the adjutants of the regiments at the head of the brigade; where he takes and marches the detachments, &c. to the general rendezvous. He ought to be an expert captain, to know the ſtate and condition of the brigade, and keep a roll of the colonels, lieutenant-colonels, majors, and adjutants. 3. Major of a regiment, the next officer to the lieutenant-colonel, generally promoted from the eldeſt captain. He is to take care that the regiment be well exerciſed, to ſee it march in good order, and to rally it in caſe of its being broke. He is the only officer among the foot that is allowed to be on horſeback in time of action, that he may the more readily execute the colonel's orders, either in advancing or drawing off the regiment. 4. Major of a regiment of horſe, is the firſt captain, who commands in the abſence of the colonel. 5. Town-major, the third officer in a garriſon, being next to the deputy-governor. He ought to underſtand fortification, and hath charge of the guards, rounds, patrols, &c. His buſineſs is alſo to take care that the ſoldiers arms are in good order; he likewiſe orders the gates to be opened and ſhut, and gives the governor an account of all that paſſes within the place.

There are alſo aids-major, drums-major, &c. ſo called from their preheminence above others of the ſame denomination.

MAJOR, in logic, the firſt propoſition of a ſyllogiſm. See the article SYLLOGISM.

MAJOR and MINOR, in muſic, ſignify imperfect concords, which differ from each other by a ſemi-tone minor. See CONCORD.

MAJOR-DOMO, an appellation formerly given to the ſteward or maſter of the king's houſhold.

MAJORANA, marjoram, in botany, a low plant, with ſlender, ſquare, branched, woody ſtalks, and little, oval, ſomewhat downy leaves, ſet in pairs: on the tops grow ſcaly heads of ſmall whitiſh labiated flowers, whoſe upper lip is erect and cloven, the lower divided into three ſegments. It is ſown annually in gardens, for culinary as well as medicinal uſes: the ſeeds, which rarely come to perfection in England, are procured from the ſouth of France, where the plant is ſaid to be indigenous.

The leaves and tops of marjoram have a pleaſant ſmell, and a moderately warm aromatic bitteriſh taſte. Infuſions of them in water, in colour browniſh, ſmell pretty ſtrongly, and taſte weakly and unpleaſantly of the herb: the blackiſh green tinctures, made in rectified ſpirit, have leſs ſmell, but a ſtronger and more agreeable taſte. In diſtillation with water, an eſſential oil is obtained, amounting, as Hoffman obſerves, to about one ounce from ſixty-four of the leaves ſlightly dried; when carefully drawn, of a pale yellow colour; by age, or too haſty fire in the diſtillation, contracting a reddiſh hue; of a very hot penetrating taſte, and in ſmell not near ſo agreeable as the marjoram itſelf: the remaining decoction, thus diveſted of the volatile aromatic matter, is weakly, but unpleaſantly, bitteriſh and auſtere. Great part of the aromatic matter of the herb riſes alſo in the inſpiſſation of the ſpirituous tincture, and impregnates the diſtilled ſpirit: the remaining extract is ſtronger in taſte than that made with water, its quantity being leſs, but has not much of the warmth or flavour of the marjoram.

This plant has been chiefly recommended in diſorders of the head and nerves, in uterine obſtructions and mucous diſcharges proceeding from what is called a cold cauſe, that is, from a laxity and debility of the ſolids, and a ſluggiſh ſtate of the juices, and in the humoural aſthmas and catarrhs of old people. The powder of the leaves, thin diſtilled water, and the eſſential oil properly diluted, are agreeable errhines, and accounted particularly uſeful in pituitous obſtructions of the noſtrils, and diſorders of the olfactory organs.

MAJORITY, the greater number of perſons.

MAIZE, a ſpecies of grain ſo generally uſed for food in America, that it has obtained the name of Indian corn.

The ſize of its ear differs greatly, according to the fertility of the ſoil, and the warmth of the climate in which it is cultivated; but at a medium, it is about a ſpan long, and commonly has eight or more rows of grain, each of which uſually contains upwards of thirty ſeeds, of various colours, as red, white, yellow, blue, olive, greeniſh, blackiſh, ſpeckled, ſtriped, &c. ſometimes in the ſame field, and the ſame ear: but the white and yellow are the moſt common: nor does this diverſity of colours ever reach beyond the outſide of the grain, the flour of which always is white, with a little tinge of yellow. Theſe ſeeds, which are as big as large peas, are round at their outer ſurface, very ſmooth, and ſet extremely cloſe, in ſtraight lines. The ear is cloathed and armed with ſeveral ſtrong thick huſks, which defend it not only from unſeaſonable rains and the cold of the night, for it does not ripen fully in ſome places till towards the latter end of September, but alſo from crows and other birds, which, being allured by the ſweetneſs of the grain before it hardens, flock to it in great numbers, ſuck through the top of the outer covering, and devour as far as they can reach. In the northern colonies, the ſtalk of this plant, which contains a remarkable ſweet pith, and is jointed like a cane, does not grow near ſo high as in the ſouthern parts. It has long leaves, almoſt like flags, at every joint, and at top a bunch of flowers, of various colours, highly pleaſing to the eye. The northern Indians, far up in the country, have a ſpecies of this grain, called Mohawk's corn, which never grows high, and, though planted in June, ripens in due ſeaſon. The general time of planting it is between the middle of March and the beginning of June, or, more particularly, from the middle of April to the middle of May.

This plant is ſeldom cultivated in England for uſe, though it might probably turn to good account, as was lately experienced by a gentleman in Lincolnſhire, who planted this corn in an open field, where it ripened perfectly, and yielded an abundant crop. Large quantities of it are raiſed in Aſia and Africa, in ſeveral parts of France, in Italy, and North America.

The Engliſh in North-America plough the ground thoroughly before the grain is planted. They ſeldom, if ever, dung the whole face of the field, but ſometimes put a little dung in each hill of corn, if they think the ground requires it.

In order to plant the corn, they make trenches or furrows, with a plough, acroſs the field, at certain diſtances from each other, and croſs theſe with others of the ſame diſtance, which divide the field into ſquares; and where the trenches interſect, the grain is put in, and covered. Three or four grains are commonly planted for each hill. The intermediate ground is afterwards ploughed at leiſure, as the plants grow, and want more looſe earth for the roots to ſpread in. The hills are made at the time of weeding; ſome looſe earth being then hoed up over the roots, and round the ſtems or ſtalks of the corn.

The corn is planted at different diſtances in different places. In the north colonies the maize grows low, ſeldom exceeding four or five feet in height; and the leaves being proportionable ſmall, the plants do not require ſo much ground as in the ſouthern colonies, where they frequently riſe to fourteen or fifteen feet. The ſpace generally allowed for the loweſt plants is three feet, and for the higheſt, five or ſix.

The panicles, or toſſils, contain the *farina fecundans* of the plant, and therefore ſhould not be cut off till the grain in the ear is filled. If the toſſils of a whole field ſhould be cut off before that time, there would be no grain at all in the ears. This has been proved by experience.

In the more ſouthern colonies, where hay is ſcarce, and the leaves of this corn are very large, they cut them off for fodder; but in the northern colonies, where there is plenty of hay, and the leaves of the corn are ſmall, they generally neglect cutting off the toſſils, and ſtripping off the leaves. They are left on the ſtalks, and the cattle being turned into the fields, after the corn is gathered-in, eat what they like of them; but they are not eſteemed ſo good as what has been cut in ſeaſon.

An eaſy way of taking the grain out of the ears, is, to rub one againſt another, holding one in each hand.

When the ears are ſtripped off their huſks, they are reckoned in the beſt ſtate for preſervation; much better than when the grain is rubbed off from the ear; for then, ſay they, inſects can get at the ſoft part of the grain, and eat into it; which they cannot do while the ſoft part is connected with the cob in the ear, and the hard flinty part of every grain turned outward, and the grains cloſe to each other.

The manner of uſing this corn in America is various. It has this advantage over wheat, that ſubſtance may be drawn from your corn-fields long before the general harveſt; for the green ears roaſted are delicate food; and as the corn ripens and grows harder, the ears boiled are good eating with butter and ſalt. When it is ripe, the corn, parched and ground into meal, is the hunting and war proviſion of the Indians; being light to carry, and affording good nouriſhment. They mix a little of it with water, and it needs no other cooking, having already paſſed the fire in the parching. The grain ſoaked in water will part with its ſkin when beat in a large morter with a wooden peſtle; then it is boiled and eaten with milk. Being pounded coarſely, dry, it is alſo boiled and eaten as rice. Bag puddings, and baked puddings made of it properly, are very good. The meal is alſo boiled with water, to make what they call a haſty-pudding, which they eat with butter and ſugar, or with milk. This haſty-pudding or boiled meal, being mixed with twice as much dry wheat flour, and worked into loaves, makes much better and pleaſanter bread than flour alone.

MAKING-UP, among diſtillers, the reducing ſpirits to a certain ſtandard of ſtrength, uſually called proof, by the admixture of water; which ſhould be either ſoft and clear-river water, or ſpring water rendered ſoft by diſtillation.

MALACHI, or *the Prophecy of* Malachi, a canonical book of the Old Teſtament, and the laſt of the twelve prophets. Malachi propheſied about three hundred years before Chriſt reproving the Jews for their wickedneſs after their return fom Babylon, charging them with rebellion, ſacrilege, adultery, prophaneneſs, and infidelity, and condemning the prieſts for being ſcandalouſly careleſs in their miniſtry; at the ſame time not forgetting to encourage thoſe pious few, who in that corruptage, maintained their integrity. This prophet diſtinctly points at the Meſſiah, who was ſuddenly to come to his temple, and to be introduced by Elijah the prophet, that is, by John the Baptiſt, who came in the ſpirit and power of Elias or Elijah.

MALACHITES, or Molochites, in natural hiſtory, &c. a ſpecies of jaſper, ſuppoſed to be poſſeſſed of amuletic virtues. See Jasper and Amulet.

MALACIA, μαλακια, in medicine, is a languiſhing diſorder incident to pregnant women, in which they long ſometimes for one kind of food, and ſometimes for another, and eat it with an extraordinary greedineſs. When women labouring under this diſorder begin to abſtain from the improper and abſurd things they were fond of, and with leſs reluctance uſe laudible and wholeſome aliments, it is an infallible ſign of a beginning cure and approaching health. Pregnant women are generally freed from the malacia about the fourth month; but if it continues longer it is dangerous becauſe the peccant humours are deeply rooted. For the cure of this diſorder in pregnant women, but few medicines are recommended, for fear of abortion; however, gentle medicines may be uſed for evacuating and corroborating the ſtomach. In young women labouring under a chloroſis, this diſtemper is cured by the ſame medicines that are proper for removing the chloroſis. See the article Chlorosis.

MALACOPTERYGIOUS, among ichthyologiſts, an appellation given to one of the five orders of fiſhes, from their having the ray of their fins bony, but not pointed or ſharp at the extremities, like thoſe of acanthopterygious fiſhes. See the articles Fish and Ichthyology.

MALACOSTOMOUS Fishes, thoſe deſtitute of teeth in the jaws, called in Engliſh leathermouthed; as the tench, carp, bream, &c.

MALAGMA, a cataplaſm. See the article Cataplasm.

MALANDERS, in farriery, are cracks in the bend of a horſe's knee, that diſcharge a ſharp indigeſted matter; they are often the occaſion of lameneſs, ſtiffneſs, and the horſe's tumbling.

This diſtemper is cured by waſhing the parts with a lather of ſope warmed, or old chamber-ley; and then applying over the cracks a ſtrong mercurial ointment ſpread on tow, with which they ſhould be dreſſed, night and morning, till all the ſcabs fall off: if this ſhould not ſucceed, anoint them night and morning with a little of the following, and apply the above ointment over it.

Take of Æthiops mineral half an ounce; white vitriol one dram; ſoft green ſope ſix ounces. Anoint with this often, but firſt clip away the hair, and clear the ſcabs. On their drying up, it may be proper to give a gentle purge or two; or the nitre-balls may be taken advantageouſly for a fortnight or three weeks.

MALE, *Mas*, among zoologiſts, that ſex of animals which have the parts of generation without the body. See the articles ANIMAL, SEX, and GENERATION.

The term male has alſo, from ſome ſimilitude to that ſex in animals, been applied to ſeveral inanimate things: thus we ſay, a male flower, a male ſcrew, &c. See the articles FLOWER and SCREW.

MALICE, in law, is a premeditated deſign to do miſchief to another.

MALIGNANT, among phyſicians, a term applied to diſeaſes of a very dangerous nature, and generally infectious: ſuch are the dyſentery, hoſpital fever, &c. in their worſt ſtages.

MALL, or SEA-MALL, in ornithology, the Engliſh name of the leſſer gull, with a grey back and ſpotted neck, and about the ſize of the common tame pigeon.

MALLEABLE, a property of metals, whereby they are capable of being extended under the hammer. See the articles DUCTILITY and METAL.

MALLEOLUS, in anatomy, a name given by anatomiſts to the inferior extremities of the tibia and fibula.

MALLET, a kind of large wooden hammer, uſed by artificers who work with a chiſſel, as ſculptors, maſons, and ſtone-cutters, whoſe mallets are commonly round; and by joiners, carpenters, &c. who work with ſquare-headed mallets.

Caulking MALLET, a mallet uſed by caulkers to drive oakum into the ſeams of a ſhip. See the article CAULKING.

Serving MALLET, among ſailors, a mallet uſed in ſerving ropes. See the article SERVICE.

The uſe of the mallet is to bind the ſpun-yarn or other line very tight about the rope, to prevent it from being chafed by friction; two or three turns of the ſpun-yarn, for this purpoſe, are wound about the body of the mallet, and while one man paſſes the ſpun yarn ball, another binds the turns of it on the rope, by turning the mallet round it, which draws it very tight.

MALLEUS, in anatomy, a bone of the ear, ſo called from its reſemblance to a mallet, and in which is obſerved the head, the neck and handle, which is joined to the membrane of the tympanum. See EAR.

MALLOW, *Malva*, in botany, a genus of plants, whoſe flower conſiſts of five petals, vertically cordated, plane and coaleſcing at their baſe; the filaments are numerous, and topped with reniform antheræ: the fruit conſiſts of a number of capſules, joined together by an articulation, and of an orbicular depreſſed figure, ſeparating from one another, and opening inwardly: the receptacle, affixed to the capſules, is columnar, and the ſeed is ſolitary and kidney-ſhaped.

The common mallow is ſo well-known as to require no deſcription; it is one of the five emollient herbs, being looſening, cooling, and mollifying: a cataplaſm of the leaves of this plant, eaſes the ſting of bees or waſps.

Marſh-MALLOW, *Althæa*. See ALTHÆA.

Tree-MALLOW. See LAVATERA.

Vervain-MALLOW. See ALCEA.

MALMSEY, a rich kind of wine, ſo called, as being brought from Malvaſia, in the Morea.

MALOPE, in botany, a genus of plants the flower of which is like that of the common mallow; the fruit is compoſed of many cells, which are collected in a head, each containing a kidney-ſhaped ſeed.

MALPHIGHIA, in botany, a genus of plants, the flower of which is compoſed of five large, hollow, kidney-ſhaped petals, with long and linear ungues: the ſtamina are ten broad ſubulated filaments, topped with heart-ſhaped antheræ: the fruit is a large globoſe berry, containing oſſeous, oblong, obtuſe, and angulated ſeeds, each having an oblong and obtuſe kernel.

MALT, is barley prepared, to fit it for making a potable liquor called beer, or ale, by ſtopping it ſhort in the beginning of vegetation.

In making malt from barley, the uſual method is to ſteep the grain in a ſufficient quantity of water, for two or three days, till it ſwells, becomes plump, ſomewhat tender, and tinges the water of a bright brown, or reddiſh colour. Then, this water being drained away, the barley is removed from the ſteeping-ciſtern to the floor, where it is thrown into what is called the wet couch; that is, an even heap, riſing to the height of about two feet. In this wet couch, the capital part of the operation is performed; for here the barley ſpontaneouſly heats, and begins to grow, ſhooting out firſt the radicle, and if ſuffered to continue, then the plume, ſpire or blade. But the proceſs is to be ſtopped ſhort at the eruption of the radicle, otherwiſe the malt would be ſpoiled. In order to ſtop it, they ſpread the wet couch thin over a large floor, and keep turning it once in four or five hours, for the ſpace of two days, laying it ſomewhat thicker each time. After this, it is again thrown into a large heap, and there ſuffered to grow ſenſibly hot to the hand, as it uſually will in twenty or thirty hours time; then being ſpread again, and cooled, it is thrown upon the kiln to be dried criſp without ſcorching.

This is the general proceſs of malting, in which almoſt every malſter has his ſecret, or particular way of working. But to render the operation perfect, the following cautions muſt be obſerved: 1. That the barley be newly threſhed, or at leaſt newly winnowed. 2. That it be not mixed, or made up of different ſorts. 3. That it be not over ſteeped in the ciſtern, or ſo long as to make it ſoft. 4. That it be well drained. 5. That it be carefully looked after in the wet couch, ſo as to ſtop the firſt tendency of the blade to ſhooting. 6. Another caution is, to turn the wet couch inſide outermoſt, if the barley comes, and ſhoots more in the middle of the heap than on the ſides. 7. To keep it duly turning, after it is out of the wet couch. 8. To give it the proper heating in the dry heap. 9. To dry and criſp it thoroughly upon the kiln, but without a fierce fire, ſo as to be ſeveral days in drying a kiln of pale malt. And if theſe directions be carefully obſerved, the malt will always be good.

The method of malting Indian corn, or Virginia wheat, is much leſs laborious; for if this corn be buried two or three inches deep in the earth, and covered with the looſe mould dug up to make room for it, in ten or twelve days the corn will ſprout and appear like a green field; at which time, being taken up, and waſhed or fanned from its dirt, it is immediately committed to the kiln, and by this means it becomes good malt. It is obſervable of this corn, that both its root and blade muſt ſhoot to a conſiderable length, before it will make malt; and perhaps this is the caſe in all large-bodied grain.

The importation of malt from beyond the ſeas is prohibited: and on its being exported, it is not only freed from paying the exciſe of 6*d.* a buſhel, but a bounty is allowed by act of parliament, for which ſee the article CORN.

Malt-liquors have different names, and different virtues, from the different methods of preparing the malt, whence they are diſtinguiſhed into pale and brown; and from the various methods taken in brewing the liquors, whence they are divided into ale and beer, ſtrong and ſmall, new and old. See BREWING.

The colour of the liquor, and many of its effects, depend on the manner of drying the malt it is brewed with; that which has the paleſt tinge, is made with malt but ſlenderly dried; whereas, that which is high coloured, is made with malt that is high dried, or roaſted, as it were, in compariſon of the other; and amber ale is made of a mixture of both.

Another difference in the preparations of malt-liquors conſiſts in the larger quantity of hops in beer, and the ſmaller in ale; for hops add ſomething of an alkaline nature to the liquor, and not only render it more eaſy of digeſtion and ſecretion of the body, but while it is in the liquor, prevent its running into ſuch coheſions as would make it ropy, vapid, and ſour. For this reaſon, Dr. Quincy is of opinion, that for one conſtitution injured by beer, there are numbers ſpoiled by ale, which is apt to ſtuff the veſſels with ſlime and viſcidity, to make the body unweildy and corpulent, and to pave the way for cachexies, the jaundice, aſthmas, and the dropſy. The different degrees of ſtrength in malt-liquors alſo make them produce different effects. The ſtronger they are, the more viſcid parts they carry into the blood: they are therefore, in general, the more wholeſome for being ſmall; that is, of ſuch a ſtrength as to carry ſome degree of warmth into the ſtomach, but not ſo as to prevent their being proper diluters of our neceſſary food. Indeed, people of robuſt conſtitutions, who labour very hard, may diſpenſe with reaſonable quantities of the ſtrongeſt; eſpecially as their food is frequently poor and ſlender enough, the deficiencies of which this ſupplies; and their continual exerciſe and ſtrength of body, digeſts and breaks the viſcidities of the drink into convenient nouriſhment: though, in perſons of another habit and way of living, they would only produce obſtructions and ill humours. As to the age of theſe liquors, it has ſomewhat the ſame effect as hops, for thoſe that are longeſt kept, are certainly leaſt viſcid; for age, by degrees, breaks their viſcid parts, and by rendering them ſmaller, makes them fitter for ſecretion.

MALT-SPIRITS. See the articles DISTILLERY and SPIRITS.

Knights of MALTA, otherwiſe called *Hoſpitallers of St. John of Jeruſalem*, a religious military order, whoſe reſidence is in the iſland of Malta. The order conſiſts of three eſtates, the knights, chaplains, and ſervants at arms: there are alſo prieſts who officiate in the churches, friar-ſervants, who aſſiſt at the offices, and donnes or demicroſſes; but theſe are not reckoned conſtituent parts of the body: the government of the order is mixed, being partly monarchical, and partly ariſtocratical: the grand maſter is ſovereign. The knights formerly conſiſted of eight different languages, but now only ſeven, the Engliſh having withdrawn themſelves. None are admitted into this order but ſuch as are of noble birth: the knights are of two ſorts, thoſe who have a right to be candidates for the dignity of grand maſter, called grand-croſſes, and thoſe who are only knights aſſiſtants: they never marry, yet have continued from 1090 to the preſent time. The knights are received into this order either by undergoing the trials preſcribed by ſtatutes, or by diſpenſation.

MALTHA, in antiquity, a kind of cement, of which there were two ſorts, native and factitious; one of the latter ſort, much in uſe, conſiſted of pitch, wax, plaſter, and greaſe. Another kind uſed by the Romans in their aqueducts, was made of lime ſlacked in wine, incorporated with melted pitch, and freſh figs. Natural maltha is a kind of bitumen, wherewith the Aſiatics plaſter their walls; and which being once ſet on fire, water makes it burn more fiercely.

MALVA, mallows. See MALLOWS.

MALUS, the apple-tree, in botany. See the article APPLE.

MAMALUKES, the name of a dynaſty that reigned in Egypt.

The Mamalukes were originally Turkiſh and Circaſſian ſlaves, bought of the Tartars by Melicſaleh, to the number of a thouſand, whom he bred up to arms, and raiſed ſome to the principal offices of the empire. They killed ſultan Moadam, to whom they ſucceeded.

Others ſay, that the Mamalukes were ordinarily choſen from among the Chriſtian ſlaves, and that they were the ſame thing in a great meaſure with the Janiſſaries among the Turks. They never married. They firſt are ſaid to have been brought from Circaſſia, and ſome have ſuppoſed that they began to reign about the year 869.

MAMMÆ, the breaſts, in anatomy, two eminences, more or leſs round, ſituated in the anterior, and a little towards the lateral parts of the thorax; their middle part lying almoſt oppoſite to the bony extremity of the ſixth rib on each ſide.

In children of both ſexes, and in males of all ages, they are commonly no more than cutaneous tubercles, or ſoft verrucæ of a roundiſh colour, called papillæ, or nipples; each of them being ſurrounded by a ſmall, thin, and pretty broad circle, more or leſs of a browniſh colour, and an uneven ſurface, termed areola.

In females, when come to the age of puberty, which is ſometimes ſooner, ſometimes later, a third part is joined to the two former, which is a convex protuberance more or leſs round, of about five or ſix fingers in breadth, the papilla and areola being ſituated near the middle of the convex ſurface. This is what is properly termed the mamma, and it may be called the body of the breaſt, when compared with the other two parts. It increaſes with age, and is very large in women with child, and in thoſe that give ſuck. In old age it decreaſes and becomes flabby, loſing its natural conſiſtence and ſolidity.

The body of the breaſt is partly glandular, and partly made up of fat; or it is a glandular ſubſtance, mixed with portions of the membrana adipoſa, the cellulous pellicles of which ſupport a great many blood-veſſels, lymphatics, and ſerous or lactiferous ducts, together with ſmall glandular moleculæ, which depend on the former; all of them being cloſely ſurrounded by two membranes, continued from the pelliculæ.

The innermoſt of theſe two membranes, which is, in a manner, the baſis of the body of the mamma, is thick and almoſt flat, adhering to the muſculus pectoralis major. The ſecond or external membrane is thinner, forming a particular integument for the body of the breaſt, more or leſs convex, and adhering cloſely to the ſkin.

The corpus adipoſum of the breaſt in particular is a ſpongy cluſter, more or leſs interlarded with fat, or a collection of membranous pelliculæ, which, by the particular diſpoſition of their outſides, form a kind of membrane in ſhape of a bag, in which all the reſt of the corpus adipoſum is contained. The anterior or outer portion of this bag, or that which touches the ſkin, is very thin; but that ſide next the pectoralis major is thick.

The glandular body contains a white maſs, which is merely a collection of membranous ducts, narrow at their origin, broad in the middle, and which contract again as they approach the papillæ, near which they form a kind of circle of communication. They are called ductus lactiferi.

The areola is formed by the ſkin; the inner ſurface of which ſuſtains a great number of ſmall glandular moleculæ, of that kind which Morgagni calls glandulæ ſebacæ. They appear very plainly all over the areola, even on the outſide, where they form little flat eminences, at different diſtances, quite round the circle.

Theſe tubercles are perforated by ſmall holes, through which a kind of ſebaceous or cheeſy matter, more or leſs liquid, may be ſqueezed out. Sometimes this is a ſerous liquor, ſometimes a milky ſerum, and ſometimes pure milk, eſpecially in nurſes; and I have ſeen both ſerous and milky drops come out at the ſame time.

From thence I am inclined to think, that theſe holes communicate with the lactiferous ducts, and that the tubercles are a kind of auxiliary papillæ added to the true ones. The different liquors that may be ſqueezed from the ſame glandular body, give alſo room to think that the holes in them communicate by their extremities with ſeveral other ſmall holes. The tubercle in the center of the areola is termed papilla, or the nipple: it is of different ſizes in different ages and conſtitutions, and in the diffent conditions of females in particular. In women with child, or who give, ſuck, it is pretty large, and generally longer and higher than it is thick or broad; and when it happens to be ſhort, it cauſes great uneaſineſs to the child.

The texture of the nipple is ſpongy, elaſtic, and liable to divers changes of conſiſtence. It ſeems to be made up principally of ligamentary faſciculi, the extremities of which form the baſis and apex of the nipple: theſe faſciculi appear to be gently folded or curled, their whole length; and if, by drawing the fibres out, theſe folds be deſtroyed, they return again as ſoon as that action ceaſes.

Between theſe faſciculi lie ſeven or eight partiticular tubes, at ſmall diſtances from each other, and all in the ſame direction; theſe tubes end at the baſis of the papilla, in the irregular circle of communication of the lactiferous ducts, and at the apex, in the ſame number of almoſt imperceptible holes; and as they are cloſely united to the elaſtic faſciculi, they are folded in the ſame manner with them.

The body of the papilla is covered by a thin cutaneous production, and by the epidermis; its outer ſurface is uneven, being full of ſmall wrinkles;

among which, thoſe near the circumference of the nipple ſeem to have a tranſverſe or annular diſpoſition, which, however, is not uniform.

This diſpoſition ſeems to be owing to the elaſtic folds; and from this ſimple ſtructure it is eaſy to explain how infants in ſucking the nipple, and women in drawing the teats of cows, bring out the milk. For the excretory tubes, being wrinkled in the ſame manner as the faſciculi, do by theſe folds, as by ſo many valves, hinder the milk contained in the ducts from flowing out; but when the nipple is elongated, the tubes loſe their folds, and the paſſage becomes ſtraight. Beſides this, when they are drawn with a conſiderable force, the whole body of the breaſt is increaſed in length, and contracted in breadth, and thereby the milk is preſſed into the open tubes; and thus, by barely preſſing the body of the breaſt, the milk may be forced toward the nipple, and even through the tubes.

The arteries and veins diſtributed through the mammæ are ramifications of the arteriæ and venæ mammariæ, of which one kind comes from the ſubclaviæ, and are called mammariæ internæ; the other from the axillares, called mammariæ externæ.

Theſe veſſels communicate with each other, with thoſe near them, and with the vaſa epigaſtrica. The nerves come principally from the coſtales, and by means of theſe communicate with the great nervi ſympathetici.

The uſe of the breaſts, in the nouriſhment of children, is well known to the world: but it is not certainly known what the papillæ and areolæ in men can be deſigned for. Milk has been obſerved in them in children of both ſexes.

MAMMEA, in botany, an ever-green tree, which grows to the height of ſixty or ſeventy feet: the leaves are large and ſtiff; the flower conſiſts of four roundiſh concave petals, which ſpread open; the filaments are ſubulated and numerous, and top'd with roundiſh antheræ; the fruit is a large carnoſe berry, incloſing one, two, or three large oval ſtones.

It grows in great plenty in the Spaniſh Weſt-Indies, where the fruit is generally ſold in their markets. It is of a yellowiſh green colour when ripe, very grateful to the palate, and is eſteemed one of the beſt fruits of that country.

MAMMIFORM, in anatomy, a name given to apophyſes of the bone in the back part of the ſcull, ſo called from their reſembling a breaſt.

MAMMILLARY, MAMMILLARIS, in anatomy, an epithet given to two little protuberances, ſomewhat reſembling the nipples of the breaſt, found under the four ventricles of the brain, and ſuppoſed to be the organs of ſmelling. Theſe are called apophyſes mammillares. There is alſo a muſcle called mammillaris, or maſtoides, ſerving to ſtoop the head.

MAMMOTH'S TEETH, in natural hiſtory, certain large foſſile teeth, found in great plenty in Ruſſia, and ſuppoſed to have belonged to elephants.

MAN, *Homo*, in zoology, is juſtly ranked at the head of the animal part of the creation; making a diſtinct genus of that order of quadrupeds, which Linnæus calls anthropomorpha; from their reſemblance to the human form.

The ſame author diſtinguiſhes the race of mankind, according to their different colours, into the Europeans, or white men; the Americans, or copper-coloured men: the Aſiatics, or tawny coloured men: and thoſe of Africa, or blacks.

MANATI, in zoology, an animal called by Linnæus thrichechus. See THRICHECHUS.

MANCHINEEL, hippomane, in botany, a large tree growing naturally in the Weſt-Indian iſlands. It hath a ſmooth browniſh bark; the trunk divides upwards into many branches, which are furniſhed with oblong leaves about three inches long and an inch and a half broad, ending in acute points ſlightly ſerrated on their edges, of a licid green, and ſtanding on ſhort footſtalks. The flowers come out in ſhort ſpikes at the ends of the branches; they are male and female, and both apetalous; the female flower is ſucceeded by a large globoſe fruit (of a yellow colour when ripe) incloſing a rough woody ſhell, with ſeveral cells, which contains in each an oblong ſeed.

The fruit of the manchineel tree is very dangerous to eat, cauſing violent inflammations in the mouth and throat; the wood is much eſteemed in America, for making cabinets, book caſes, &c. being very durable, and taking a fine poliſh; it is alſo ſaid that the worms will not eat it. As the trees abound with milky cauſtic juice, ſo before they are felled, they make fires round their trunks, to burn out their juice, otherwiſe thoſe who fell them would be in danger of loſing their ſight, by the juice flying into their eyes; and wherever this falls on the ſkin, it will raiſe bliſters; if dropt on linen, it immediately turns the part black, and on being waſhed will come in holes. It is alſo dangerous working the wood after it is ſawed out, for if any of the ſaw-duſt happens to get in the workman's eyes, it cauſes inflammations and the loſs of ſight for ſome time; to prevent which, when they are working it they generally cover their faces with fine lawn.

MANDAMUS, in law, a writ that iſſues out of the King's-Bench, ſent to a corporation, commanding them to admit or reſtore a perſon to his office.

MANDARINS, a name given to the magiſtrates and governors of provinces in China, who are choſen out of the moſt learned men, and whoſe government is always at a great diſtance from the place of their birth. Mandarin is alſo a name given by the Chineſe to the learned language of the country; for beſides the language peculiar to every province,

vince, there is one common to all the learned in the empire, which is in China what Latin is in Europe; this is called the Mandarin tongue, or the language of the court.

MANDATE, in law, a judicial commandment to do ſomething.

Mandate, in the canon-law, a reſcript of the pope, commanding an ordinary collator to put the perſon therein named in poſſeſſion of the firſt vacant benefice in his collation.

MANDRAKE, *Mandragora*, in botany, a plant, whoſe root is thick, long, and taper, like thoſe of the parſnip: it runs a conſiderable depth in the ground; it is ſometimes ſingle, and at others divided into two or three branches; it is whitiſh within, and of a ruſty aſh-colour without; it hath no ſtalks, the leaves ariſing immediately from the root, ſtanding erect at firſt, but when full grown they ſpread open and lay on the ground; they are more than a foot in length, and four or five inches broad in the middle, growing narrow towards both ends; of a dark green colour and a fetid ſcent; between theſe come out the flowers, upon a ſhort footſtalk; theſe are erect, monopetalous, and campanulated. The fruit is a large globoſe berry, containing two cells, with a fleſhy, convex receptacle; the ſeeds are numerous, and kidney-ſhaped. Mandrake grows wild in Italy, Spain, Portugal, and other warm countries. The roots will remain ſound fifty years or more: but as to the reſemblance to a human form, as many aſſert, it is nothing but an impoſture, owing to perſons that would deceive the public, who form the freſh roots of briony into ſuch ſhapes, and ſhew them for mandrakes. (See the article Bryonia). Many wonderful things have been ſaid of its virtues by different authors; however, they all agree it is a narcotic, and when taken in too large a doſe will produce dangerous ſymptoms. It is reckoned cooling in external applications, and therefore recommended in inflamations of the eyes.

MANDREL, a kind of wooden pulley, making a member of the turner's lathe, of which there are ſeveral kinds, as the flat mandrels, which have three or more little pegs or points near the verge, and are uſed for turning flat boards on; the pin mandrels are thoſe which have a long wooden ſhank to fit into a large hole made in the work to be turned; hollow mandrels are thoſe hollow of themſelves, and uſed for turning hollow work: ſcrew mandrels for turning ſcrews, &c

MANE, the hair hanging down from a horſe's neck, which ſhould be long, thin, and fine; and if frizzled, ſo much the better.

MANEGE, or Manage, the exerciſe of riding the great horſe, or the ground ſet apart for that purpoſe; which is ſometimes covered, for continuing the exerciſe in bad weather; and ſometimes open, in order to give more liberty and freedom both to the horſemen and horſe.

One way or other we may always ſuppoſe a center in the middle of the manege-ground, for regulating the rounds and volts. Sometimes this center is diſtinguiſhed by a pillar fixed in it, to which they tie the horſe when he begins to learn: upon the ſide of the manege other pillars are placed, two by two, in order to teach horſes to raiſe the fore quarters, by tying them with ropes. See Pillar.

MANES, in the pagan ſyſtem of theology, a general name for the infernal deities, or gods of hell.

The ancients comprehended under manes, not only Pluto, Proſerpine, and Minos, but the ſouls likewiſe of the deceaſed were taken into the number, and eſteemed gods of hell. It was uſual to erect altars and offer libations to the manes of deceaſed friends and relations.

MANGER, in the ſea-language, a ſmall apartment in the fore-part of a ſhip, which is fenced on the after-part by a ſort of bulk-head or barrier; the uſe of which is to prevent the water, which ruſhes in at the hawſe-holes, or the holes through which the cable goes, from running aft on the lower decks, which would render them extremely uncomfortable to the men, who eat and ſleep there. As ſoon as the water enters at the hawſe-holes, which is always the caſe when the ſhip pitches deep forward, it is conveyed away again through the ſide into the ſea by ſeveral ſmall pipes or channels, called ſcuppers. See Scuppers.

MANGO Tree, in botany, the name of a vaſt tree, forty feet in height, and eighteen in thickneſs, and ſpreads its numerous branches all around at a great diſtance, being always green, and bearing fruit once or twice a year, from ſix or ſeven years old to an hundred. It is propagated by inciſion, or ſowing the ſeed, in Malabar, Goa, Bengal, Pegu, and many other countries in the Eaſt-Indies.

The fruit is of a round oblong figure, flat, ſlightly ſinuated, or hollowed at the ſides, and ſhaped much like a kidney, bigger than a gooſe egg, ſmooth, ſhining, firſt green ſpeckled with white, then inclining to yellow, and at laſt of a gold-colour: it has a yellowiſh and ſucculent pulp, not unlike that of a peach, or rather a plumb, firſt acid, then acido-dulcid, and pleaſant to the taſte. Within the pulp is contained an oblong, compreſſed, and languanous ſtone, thin, yet very hard and tenacious, and including a callous oblong kernel, very like an oblong almond, and of the ſame bigneſs, and of a bitteriſh though not unpleaſant taſte.

There are various ſorts of this fruit, as there are of our apples and pears, which are very different, according to the country where they grow: that ſpecies which is without a ſtone, and is very grateful to the palate, ſeems to us only a variety or a degenerate fruit. The fruit is cut into ſlices, and eaten, either without wine, or macerated in wine; it is alſo candied, in order to its preſervation. Sometimes they open it with a knife, and fill up the middle with freſh ginger, garlic, muſtard, and ſalt, with oil or vinegar, that they may eat it with rice, or after the manner of pickled olives.

As to its temperament, this fruit is cold and moiſt, though the Indian phyſicians affirm the contrary. We make uſe of pickled mangoes, which are imported to us, as we do of pickled cucumbers, for ſauce to roaſted meat. The ſtones roaſted are ſaid to cure a looſeneſs, which Garcius found to be true. The wood of the tree, with cinders, is uſed for burning the carcaſes of the Pagans, as being conſecrated to this rite; whence it ſerves alſo for coffins, in which they repoſit their dead; it is but of a ſoft ſubſtance, and of ſhort duration.

The ſtalks ſupply the place of arequa or caunga, in the chewing of betel; the ſame calcined and reduced to powder, take away warts. Of the tender leaves, with the bark of the Avanacoe, that is, the ricinis, the ſeed of the cummin and parpadogam, is made a decoction, which is highly beneficial in the cough, aſthma, and other affections of the thorax. The bark of the tree pulveriſed, and taken in chicken broth, is an excellent diſſolvent of extravaſated and coagulated blood, occaſioned by a fall, in any part of the body. The juice of the bark, with the white of an egg, and a very little opium, taken inwardly, is a preſent remedy againſt the diarrhœa, dyſentery, and teneſmus. Of the gum of the tree, and the flowers of rice, with the addition of a ſmall quantity of opium and pepper, are prepared pills, which alſo cure all ſorts of fluxes of the belly. Of the flour of the dried kernels, the natives have the art of preparing various kinds of food.

MANGANESE, MAGNESIA, in natural hiſtory, a poor kind of iron ore. See IRON.

It is a denſe heavy ſubſtance in its fineſt pieces; being compoſed of a number of broad and thick ſtriæ irregularly laid together, and much reſembling thoſe of native antimony; in theſe maſſes it is ſometimes reddiſh, ſometimes of a dark grey, and ſometimes of a fine pale light grey, approaching to the colour of the fineſt poliſhed iron: but there is a leſs perfect kind, in which the whole maſs ſeems only to conſiſt of a number of irregularly figured pieces, of a brittle and ſomewhat gloſſy ore, blended very looſely together.

Mangancſe is found in great abundance in the German and Swediſh mines, as alſo in France, Italy, and England; but ours is not equal in beauty or goodneſs to the German. It is recommended by authors as an aſtringent, and ordered to be given after calcination in hæmorrhages: but it is very improper for internal uſe. It is of great ſervice, however, to the glaſſmen, in clearing away the greeniſh colour from their white glaſs while in fuſion. See GLASS.

MANICHEES, in church hiſtory, a ſect of Chriſtian heretics in the third century, the followers of Manes, who made his appearance in the reign of the emperor Probus; pretending to be the Comforter, whom our Saviour promiſed to ſend into the world. He taught that there are two principles, or gods, coeternal and independent on each other, the one the author of all evil, and the other, of all good; a doctrine which he borrowed from the Perſian Magi. He held that our ſouls were made by the good principle, and our bodies by the evil one, and that the ſouls of his followers paſſed through the elements to the moon, and from thence to the ſun, where being purified, they then went to God, and became united with his eſſence; but as for the ſouls of other men, they either went to hell, or were united to other bodies. He alledged that Chriſt had his reſidence in the ſun, the Holy Ghoſt in the air, Wiſdom in the moon, and the Father in the abyſs of light. He is alſo charged with denying the reſurrection, and condemning marriage; with teaching that Chriſt was the ſerpent that tempted Eve; with forbidding the uſe of eggs, cheeſe, milk, and wine, as proceeding from the bad principle; with uſing a different kind of baptiſm from that of the church; with teaching that magiſtrates were not to be obeyed, and with condemning the moſt lawful wars.

MANICORDON, or MANICHORD, a muſical inſtrument in the form of a ſpinnet; the ſtrings of which, like thoſe of the clarichord, are covered with little pieces of cloth, to deaden, as well as to ſoften their ſound; whence it is alſo called the dumb ſpinnet. It is much uſed in nunneries, becauſe the nuns may play upon it without diſturbing that ſilence which they are obliged to obſerve in their cells.

MANIFESTO, a public declaration made by a prince in writing, ſhewing his intentions to begin a war, or other enterprize, with the motives that induce him to it, and the reaſons on which he founds his rights and pretenſions.

MANILLE, in commerce, a large braſs ring in the form of a bracelet, either plain or engraven, flat or round.

Manilles are the principal commodities which the Europeans carry to the coaſt of Africa, and exchange with the natives for ſlaves. Theſe people wear them as ornaments on the ſmall of the leg, and on the thick part of the arm above the elbow.

MANIPULUS, in Roman antiquity, a body of infantry, conſiſting of two hundred men, and conſtituting the third part of a cohort. See the article COHORT.

Among phyſicians, the term manipulus ſignifies a handful of herbs or leaves, or ſo much as a man can graſp in his hand at once; which quantity is frequently denoted by the abbreviature, M, or *m*.

MANNA, in the materia medica, a ſweet juice obtained from certain aſh-trees in the ſouthern parts of Europe, particularly in Calabria and Sicily; exuding from the leaves, branches, or trunk of the tree, and either naturally concreted, or exſiccated and purified by art.

Juices of the ſame nature are collected, in the Eaſtern countries, from other trees and ſhrubs: and ſimilar exudations are ſometimes found on different kinds of trees in Europe, as particularly on the larch in the Briançonois in Dauphiny. How far the manna juices of different vegetables differ from one another, is not well known; but this much is certain, that one and the ſame tree affords mannas very conſiderably different, in their colour, in their taſte, and in their diſpoſition to aſſume a ſolid concrete form: that is, in their purity, or the greater or leſs admixture of oily or reſinous matter.

The beſt ſort of the officinal or Calabrian manna is in oblong pieces or flakes, moderately dry, friable, very light, of a whitiſh or pale yellow colour, and in ſome degree tranſparent. The inferior kinds are moiſt, unctuous, and brown. Both ſorts are ſaid to be ſometimes counterfeited by compoſitions of ſugar, honey, and purgative materials: compoſitions of this kind, in a ſolid or dry form, may be diſtinguiſhed by their weight, compactneſs, and untranſparency, as likewiſe by their taſte, which is ſenſibly different from that of true manna, and with greater certainty by their habitude to menſtrua.

This juice liquefies in a moiſt air, diſſolves readily in water, and by the aſſiſtance of heat, in rectified ſpirit alſo; the impurities only being left by both menſtrua. On inſpiſſating the watery ſolution, the manna is recovered of a much darker colour than at firſt. From the ſaturated ſpirituous ſolution, great part of it ſeparates as the liquor cools, concreting into a flaky maſs, of a ſnowy whiteneſs, and a very grateful ſweetneſs: the liquor remaining after the ſeparation of this pure ſweet part of the manna, leaves, on being inſpiſſated, an unctuous, dark-coloured, diſagreeable matter, in greater or leſs quantity, according as the manna made uſe of was leſs or more pure.

Manna, in doſes of an ounce and upwards, proves a gentle laxative; it operates in general with great mildneſs, ſo as to be ſafely given in inflammatory or acute diſtempers, where the ſtimulating purgatives have no place. It is particularly proper in ſtomachic coughs, or thoſe which have their origin in the ſtomach; the manna, by its ſweetneſs and unctuoſity, contributing to obtund as well as to evacuate the offending humours: in this intention, it is ſometimes made into a linctus or lohoch, with equal quantities of oil of almonds and of ſyrup of violets. See LINCTUS.

In ſome conſtitutions, however, it acts unkindly, eſpecially if given in conſiderable quantity, occaſioning flatulencies, gripes, and diſtenſions of the belly; inconveniencies, which may be generally obviated by a ſmall addition of ſome grateful aromatic.

MANNER, in painting, a habitude that a man acquires in the three principal parts of painting, the management of colours, lights, and ſhadows, which is either good or bad, according as the painter has practiſed more or leſs after the truth, with judgment and ſtudy. But the beſt painter is he who has no manner at all. The good or bad choice he makes is called *goûte*.

MANNERS, in poetry, the inclinations, genius, and humour, which the poet gives to his perſons, and whereby he diſtinguiſhes his characters. See CHARACTER.

MANOMETER, or MANOSCOPE, an inſtrument to ſhew or meaſure the alterations in the rarity or denſity of the air. The manometer differs from the barometer in this, that the latter only ſerves to meaſure the weight of the atmoſphere, or of the column of air over it; but the former the denſity of the air in which it is found, which denſity depends not only on the weight of the atmoſphere, but alſo on the action of heat and cold, &c. Authors, however, generally confound the two together, and Mr. Boyle himſelf gives us a very good manometer of his own contrivance, under the title of a ſtatical barometer. See BAROMETER.

MANOR, an ancient royalty or lordſhip, formerly called a barony, conſiſting of demeſnes, ſervices, and a court-baron; and comprehending in it meſſuages, lands, meadow, paſture, wood, rents, an advowſon, &c. It may contain one or more villages, or hamlets, or only a great part of a village, &c.

A manor is a noble kind of fee, granted in part to tenants for certain ſervices to be performed, and partly reſerved to the uſe of the lord's family, with juriſdiction over the tenants, for their farms or eſtates.

There are capital manors or honours that have other manors under them; and alſo cuſtomary manors granted by copy of court roll, the lords of which have power to hold courts, and grant copies, &c.

MANSION, in law, is the chief dwelling-houſe of a lord within his fee, or the capital meſſuage or manor-houſe.

MANSLAUGHTER, generally termed homicide, is killing a perſon without premeditated malice.

MANTELETS, in the art of war, a kind of moveable parapets, made of planks about three inches thick, nailed over one another, to the height of almoſt ſix feet, generally caſed with tin, and ſet upon little wheels, ſo that in a ſiege, they may be driven before the pioneers, and ſerve as blinds to ſhelter them from the enemy's ſmall ſhot. See plate LXIX. *fig.* 7.

There are other ſorts of mantelets, covered on the

PLATE LXIX.

Facing Mantlets.

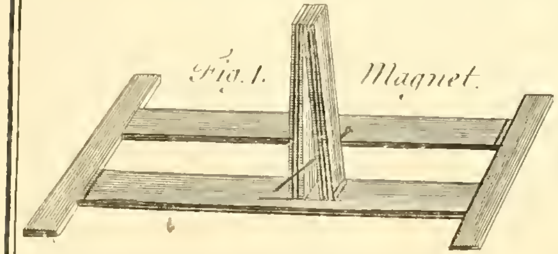
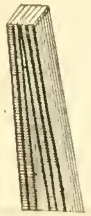


Fig. 1. Magnet.



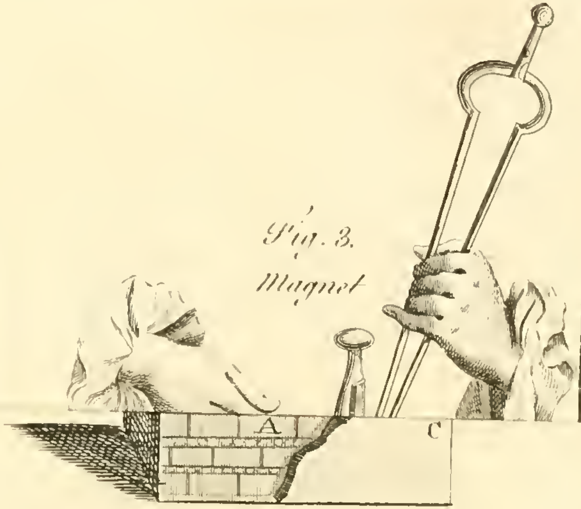


Fig. 3. Magnet

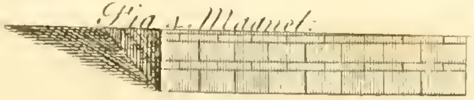


Fig. 2. Magnet.

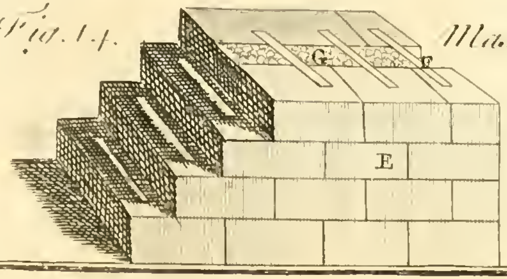


Fig. 14. Masonry.

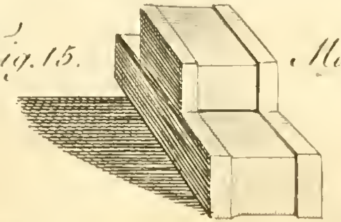


Fig. 15. Masonry.

PLATE LXIX. Facing Mantlets.

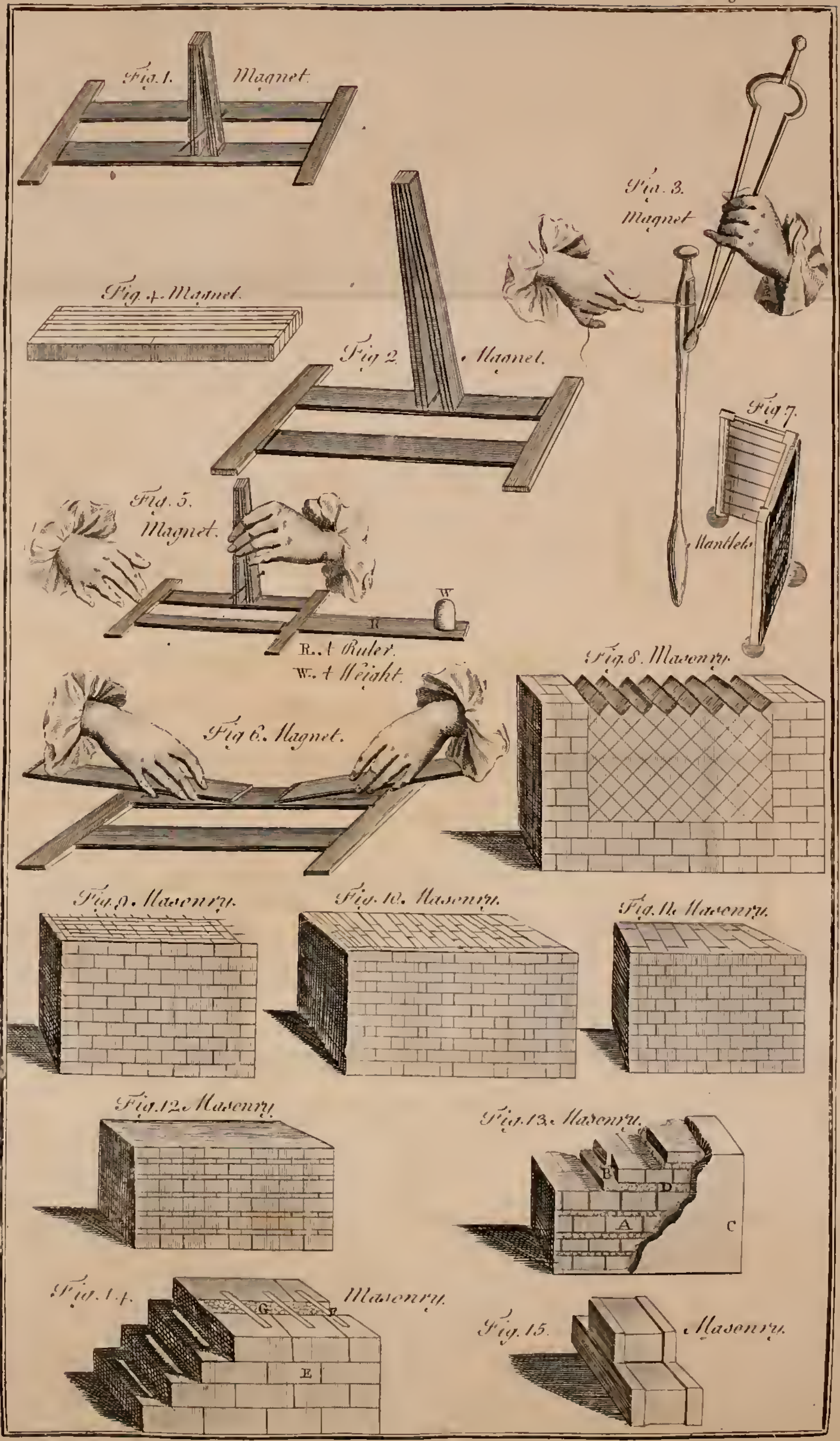


Fig. 1. Magnet.
Fig. 3. Magnet
Fig. 4. Magnet.
Fig 2. Magnet.
Fig. 7.
Mantlets
Fig. 5. Magnet.
W
R
R. A Ruler.
W. A Weight.
Fig. 8. Masonry.
Fig 6. Magnet.
Fig. 9. Masonry.
Fig. 10. Masonry.
Fig. 11. Masonry.
Fig. 12. Masonry.
Fig. 13. Masonry.
B
D
A
C
Fig. 14. Masonry.
G
F
E
Fig. 15. Masonry.

the top, of which the miners make uſe to approach the walls of a town or caſtle.

MANTLE, or MANTLE-TREE, in architecture, the lower part of the chimney, or that piece of timber which is laid acroſs the jaumbs, and ſuſtains the compartment of the chimney-piece. See CHIMNEY.

MANTLE, or MANTLING, in heraldry, that appearance of folding of cloth, flouriſhing or drapery, that is in any atchievement drawn about the coat of arms. It is ſuppoſed originally to be the repreſentation of a mantle, or military habit, worn by the ancient cavaliers over their armour to preſerve it from ruſt; or, as others hold, a ſhort covering only worn over the helmet, which in aftertimes was lengthened, and made to hang from the helmet below the whole ſhield.

The mantle is always ſaid in blazonry, to be doubled, that is, lined throughout with one of the furs, as ermin, pean, viary, &c.

MANUFACTURER, one who works up a natural product into an artificial commodity.

MANURE, in agriculture and gardening, any thing that is uſed to enrich, fatten, and improve land.

There are various kinds of manure proper for the different kinds of land we meet with: if the land is looſe and ſandy, the mud out of ponds, or ſtrong loam, makes a good manure: marle of the blue kind, and clay of the lighter ſort, ſpread over gravelly or ſandy land, are of vaſt advantage to it, by making it more ſolid and tenacious; cow-dung and hog-dung are alſo excellent for hot lands.

If the land is ſtiff, cold, and clayey, ſheep and deers dung are eſteemed by ſome the beſt manure; likewiſe the dungs of horſes, pigeons, hens, geeſe, &c. are reckoned excellent; alſo ſea and drift ſands, or ſea-coal aſhes, are good manure for theſe ſort of lands: tanners bark, laid in a heap and rotted, is an excellent manure for ſtiff cold land; and one load of it will improve the ground more, and laſt longer, than two loads of any other manure: when this is laid on graſs, it ſhould be done ſoon after Michaelmas, that the winter rains may waſh it into the earth; and where it is uſed for corn land, it ſhould be ſpread on the ſurface before the laſt plowing, that it may be turned down for the fibres of the corn to reach it in the ſpring. Rotten vegetables, of moſt ſorts, alſo greatly enrich land; ſo that, where other manure is ſcarce, theſe may be uſed with great ſucceſs: thus the weeds of ponds, lakes, and ditches, being dragged out juſt as they begin to flower, and laid on heaps to rot, will make an excellent manure; but it is to be obſerved, that in rotting theſe vegetables, it will be proper to mix ſome earth, mud, or any other ſuch like ſubſtance, with them, to prevent their taking fire in their fermentation: it will alſo be neceſſary to cover the heaps with earth, mud, or dung, to detain the ſalts, otherwiſe many of the finer parts will evaporate in fermenting.

The refuſe of kitchen-gardens, when laid on heaps and rotted, will alſo afford good manure for corn land: and alſo fern, mowed down while it is green and tender, and laid on heaps to rot, will make an excellent manure; and by frequently mowing it, this troubleſome plant will be deſtroyed.

The aſhes of all kinds of vegetables are alſo good manure for lands, ſo that where the ground is overrun with buſhes, brambles, &c. if they are grubbed up in ſummer, dried, and conſumed to aſhes, and ſpread over the land, they will greatly improve it.

Rotten wood, and ſaw-duſt when rotted, are a very good manure for ſtrong lands, as are alſo bones, horns, ſhells, woollen-rags, &c. and whatever ſerves too looſen its parts.

But for all ſtubborn clayey ſoils, there is no manure ſo good as the cleanſing of the ſtreets of large cities, the parts of tough land will be more expeditiouſly ſeparated by this, than any other compoſt, and, where it is to be had, it is of the greateſt value both for field or garden land.

MANUSCRIPT, in matters of literature, denotes a written book, in contradiſtinction to a printed one. See BOOK.

MAP, a plane figure, repreſenting the ſurface of the earth, or a part thereof, according to the laws of perſpective; diſtinguiſhing the ſituation of cities, mountains, rivers, &c.

In maps, theſe three things are eſſentially requiſite. 1. That all places have the ſame ſituation and diſtance from the great circles therein, as on the globe, to ſhew their parallels, longitudes, zones, climates, and other celeſtial appearances. 2. That their magnitudes be proportionable to the real magnitudes on the globe. 3. That all places have the ſame ſituation, bearing, and diſtance, as on the earth itſelf.

Maps are either univerſal, which exhibit the whole ſurface of the earth; or particular, which exhibit ſome particular part thereof: each kind is called geographical or land maps, in contradiſtinction to hydrographical or ſea maps, repreſenting the ſeas and ſea coaſts, properly called charts.

As a map is a repreſentation of ſome part of the ſurface of the earth delineated upon a plane, the earth being round, no part of the ſpherical ſurface of it can be accurately exhibited upon a plane, and, therefore, ſome have propoſed the making of globular maps; for this purpoſe, a plate of braſs might be hammered, or, at a leſs expence, a piece of paſteboard might be formed into a ſegment of a ſphere, and covered on its convex ſide with a map projected in the ſame, as the papers of the common globes are: a map made in this method would ſhew every thing in the ſame manner, as it would be ſeen upon a globe of the ſame diameter with the ſphere upon the ſegment of which it was delineated: and, indeed,

deed, maps of this ſort would be in effect ſegments of ſuch a globe, but they are not in common uſe.

The ancients deſcribed all the parts of the known earth in one general map; in this view, one of them compares the ſhape of the earth to the leather of a ſling, whoſe length exceeds its breadth: the length of the then known parts of the earth from eaſt to weſt was conſiderably greater than from north to ſouth; for which reaſon, the former of theſe was called the longitude, and the other the latitude.

The modern general maps are ſuch as give us a view of an entire hemiſphere, or half of the globe; and are projected upon the plane of ſome great circle, which terminates the projected hemiſphere, and divides it from the other half of the globe, as the equator, or the meridian, or horizon of ſome place: from this circle the projection is denominated, and ſaid to be equatorial, meridional, or horizontal.

Particular maps are ſuch as exhibit to us leſs than an hemiſphere; of this ſort are the maps of the great parts, into which the earth is divided, as Europe, Aſia, Africa, North-America, South-America; or maps of particular kingdoms, provinces, countries, or of leſſer diſtricts.

The projections of the circles in general maps are of two ſorts, convex and concave: to underſtand which, we may imagine the globe, upon which the circles are delineated, to be of thin glaſs, and that half of it is viewed at a time; now we may be conceived to view this hemiſphere either on the convex or concave ſide, and we may conceive it to be placed at different diſtances from the eye: from which diverſity of our view, there will ariſe different projections, or pictures of it in a map. If the eye be ſuppoſed to be placed in ſome point of the ſurface of the ſphere to view the concave of the oppoſite hemiſphere, it is called the ſtereographic projection.

In this projection, the parts about the middle are a little contracted, ſo as to be too ſmall for the extreme parts, the reaſon whereof will appear from hence (plate LXX. *fig.* 1.) that if a concave ſemicircle, with equal diviſions, be viewed with the eye in the plane of it continued, at the diſtance of a ſemi-diameter from its center, the projection will be a ſtraight line unequally divided, the parts appearing leſs the nearer to the center; conſequently, if two ſemicircles cutting one another at right angles, drawn upon a concave hemiſphere, and marked with equal diviſions, be viewed in the manner now deſcribed, the projection of them will be ſtraight lines unequally divided, as AC and BD (*fig.* 2.) the parts appearing leſs the nearer to the center. The ſtereographic projection is either equatorial, meridional, or horizontal.

The equatorial projection ſuppoſes the eye to be ſituated in one of the poles of the earth, and from thence to view the oppoſite concave hemiſphere, with its circles, projected upon a plane of glaſs paſſing through the equator. Thus the eye is ſuppoſed to be in the north pole, in order to view the ſouthern hemiſphere; and in the ſouth pole to view the northern hemiſphere. Thus *fig.* 3. is a map of the northern hemiſphere upon that projection: here the meridians are all ſtraight lines, and the parallels are complete circles.

The meridional projection ſuppoſes the eye to be in ſome point of the equator, and from thence to view the oppoſite concave hemiſphere, projected upon a glaſs plane paſſing through ſome meridian, which a meridian drawn through the eye cuts at right angles. Thus *fig.* 7. is a map of the earth in two hemiſpheres, projected upon the plane of a meridian paſſing through one of the Canary-iſlands called Ferro. This meridian is made choice of, becauſe, by making the projection thereon, one hemiſphere contains Europe, Aſia, and Africa; and the other North and South America. Here all the meridians are arches of circles, except that drawn through the eye, which is a ſtraight line; and all the parallels are arches of circles, and the equator is a ſtraight line.

M. de la Hire has invented another meridional projection, which comes the neareſt of all to the nature of the globe, becauſe the meridians are placed therein at equal diſtances, the parallels alſo are nearly equidiſtant, and conſequently the ſeveral parts of the earth have their proper proportion of magnitude, diſtance, and ſituation, nearly the ſame as on the globe itſelf.

In the horizontal projection, the eye is ſuppoſed to be in that point of the ſurface of the globe, which is diametrically oppoſite to the place upon the horizon of which the projection is made, and from thence to view the oppoſite concave hemiſphere, with its circles projected upon a glaſs plane, paſſing through that horizon. Thus, if we project any map of this ſort upon the horizon of London, the eye is ſuppoſed to be in the place of the antipodes to London, and from thence to view the concave hemiſphere. There is a great variety in this ſort of projection; for if the place the horizon it is upon, be under the pole, the horizontal projection is the ſame with the equatorial already deſcribed. If the place be under the equator, it is the ſame with the meridional: if the place be in an oblique ſphere, the projection will be different, according to the different latitude of the place; for it will approach nearer to an equatorial or meridional projection, according as the place is ſituated nearer to one of the poles, or to the equator.

Fig. 4. is a map projected upon the horizon of London, whoſe latitude is 51° 32′. The chief advantage of this kind of maps is this, that the place upon the horizon, on which the map is projected, is always in the center of it, and we may ſee the bearing of places from it.

A particular map is a part of a general one, and may be made upon the ſame principles, as by projecting a large hemiſphere, and taking ſo much of it as the map is deſigned to contain. When we are to delineate a map of a ſmaller part of the earth, if it be near the equator, the meridians and parallels may be repreſented by equidiſtant right-lines. If at ſome diſtance from the equator, the parallels may be equidiſtant ſtraight lines, and the meridians ſtraight lines, a little converging towards the neareſt pole; or the meridians may be ſtraight lines, converging towards the neareſt pole, and the parallels circular.

When we are to make a map of a very ſmall diſtrict, as of a county or hundred, whatever part of the earth it be in, the meridians and parallels may be equidiſtant ſtraight lines, drawn through every minute, &c. of longitude, according as the largeneſs of the map will allow. See PLOTTING and SURVEYING.

If the eye be ſuppoſed to view the hemiſphere at an infinite diſtance, the projection of its circles, whether it be viewed on the convex or concave ſide, is called orthographic. In this projection, the parts about the middle are very well exhibited, but the extreme parts are very much contracted. See *Orthographic* PROJECTION *of the Sphere.*

Fig. 5. is a general map of the northern hemiſphere projected orthographically upon the plane of the equator. Here the meridians are all ſtraight lines, and the parallels are complete circles. *Fig.* 6. is a general map of an hemiſphere, projected orthographically on the plane of the meridian. Here all the meridians are projected into ſemi-ellipſes, except that which is perpendicular to the plane of projection, and which becomes a ſtraight line thereon. This projection has one advantage not to be found in any other general map; namely, that the decreaſe of the parallels from the equator to the poles, appears therein in true proportion.

The great contraction of the extreme parts in the orthographic projection makes it ſo deficient in the ſecond quality required in maps, that it is ſeldom uſed, except when the diſk of the earth, in a ſolar eclipſe, is to be exhibited.

The uſe of maps is obvious from their conſtruction. The degrees of the meridians and parallels ſhew the longitude and latitude of places; their bearings from each other appear from inſpection; and their diſtances may be meaſured by the diviſions on the meridian, equator, &c.

MAPLE, *Acer*, in botany, a genus of trees producing male and hermaphrodite flowers, each having five ovate petals which ſpread over the cup. The ſtamina are eight ſhort filaments, topped with ſimple antheræ, which are crowned with a cruciform pollen. The fruit conſiſts of a number of capſules, which grow together at the baſe, and are compreſſed, roundiſh, and each terminated by a very large membranaceous ala. The ſeeds are ſingle and roundiſh.

The common maple is ſo well known as to require no deſcription. Moſt of the different ſpecies are propagated by ſowing their ſeeds ſoon after they are ripe, which is in autumn, and the ſucceeding year they will be fit to be planted in rows about three feet aſunder and two feet diſtance in the rows, where they may remain three or four years, when they will be large enough to be tranſplanted where they are intended to remain.

The timber of the common maple is far ſuperior to beech for turners uſe, particularly diſhes, cups, trenchers, &c. and when it abounds with knots (as it very often doth) it is highly eſteemed by the joiners for inlaying, &c. and alſo, for the lightneſs of the wood, is often employed by thoſe that make muſical inſtruments; and, for the whiteneſs of it, was formerly in great requeſt for tables, &c.

MARANTA, Indian arrow-root, in botany, a genus of plants, whoſe flower is monopetalous and ringent; the tube of which is oblong, compreſſed, and crooked, and its limb cut in ſix ſegments; it hath one membranaceous filament, with a linear antheræ faſtened to the border of the filament. The fruit is a roundiſh capſule, obſcurely trigonal, containing a hard, rough, ovate ſeed.

MARBLE, *Marmor*, in natural hiſtory, a genus of foſſils, being bright and beautiful ſtones, compoſed of ſmall ſeparate concretions, moderately hard, not giving fire with ſteel, fermenting with, and ſoluble in acid menſtrua, and calcining in a ſlight fire.

The colours of marbles being a very obvious and ſtriking character, they are arranged according to them, in the following diviſions. 1. Of the white plain marbles there are two ſorts; the Parian marble of the ancients, and ſtatuary marble of the moderns, an extremely bright and elegant marble; and the Carrara marble; a very fine marble, more compact and cloſe than the former, but leſs bright. 2. Of the plain yellowiſh marbles there is only one ſort, which is a hard, pale yellow, and gloſſy marble, found in many parts of Italy. 3. Of the bluiſh and black marbles there are a great many ſpecies, as the Chian marble, Baſaltes, &c. 4. Of the plain green marbles there is only one kind, the Lacedæmonian marble of the ancients. 5. The pale-coloured or whitiſh brown, commonly called Derby-marble. 6. The green marbles with ſhells. 7. The black Coralloide marble, with and without ſhells. 8. Of the white variegated marble there are a great many ſpecies, variegated with purple, brown, red, blue, &c. 9. Of the brown variegated marbles there are likewiſe ſeveral ſorts, ſome with red veins, others with white, black, or brown veins. 10. Of the yellow veined and variegated marbles ſome are veined with purple, and others with blue. 11. Of the black variegated marbles, ſome are veined with white, and others with blue, yellow, red, &c. 12. The green variegated marbles are likewiſe diſtinguiſhed by the colour of their veins. 13. The grey ſpotted marbles are variegated, ſome with black and others with green ſpots. 14. The red variegated marble is the Brocatello of the Italians, with white and gold veins.

Poliſhing of MARBLE is performed by firſt rubbing them well with a free-ſtone, or ſand, till the ſtrokes of the axe are worn off, then with pumice-ſtone, and afterwards with emery.

Colouring of MARBLE.—The colouring of marble is a nice art, and in order to ſucceed in it, the pieces of marble, on which the experiments are tried, muſt be well poliſhed, and clear from the leaſt ſpot or vein. The harder the marble is, the better it will bear the heat neceſſary in the operation; therefore, alabaſter and the common ſoft white marble are very improper to perform theſe operations upon.

Heat is always neceſſary for the opening the pores of the marble, ſo as to render it fit to receive the colours; but the marble muſt never be made red hot, for then, the texture of the marble itſelf is injured, and the colours are burnt, and loſe their beauty. Too ſmall a degree of heat is as bad as too great; for, in this caſe, though the marble receive the colour, it will not be fixed in it, nor ſtrike deep enough. Some colours will ſtrike even cold, but they are never ſo well ſunk in as when a juſt degree of heat is uſed. The proper degree is that which, without making the marble red, will make the liquor boil upon its ſurface. The menſtruums uſed to ſtrike in the colours, muſt be varied according to the nature of the colour to be uſed. A lixivium made with horſe's or dog's urine, with four parts quick-lime, and one part pot-aſhes, is excellent for ſome colours; common ley of wood-aſhes does very well for others: for ſome, ſpirit of wine is beſt; and, finally, for others, oily liquors, or common white-wine.

The colours which have been found to ſucceed beſt with the peculiar menſtruums, are theſe: ſtone-blue diſſolved in ſix times the quantity of ſpirit of wine, or of the urinous lixivium; and that colour which the painters call litmouſe, diſſolved in common ley of wood-aſhes. An extract of ſaffron, and that colour made of buckthorn berries, and called by the painters ſap-green, both ſucceed well diſſolved in urine and quick-lime, and tolerably well in ſpirit of wine. Vermillion, and a fine powder of cochineal, ſucceed alſo very well in the ſame liquors. Dragon's blood ſucceeds very well in ſpirit of wine, as does alſo a tincture of logwood, in the ſame ſpirit. Alkanet root gives a fine colour, but the only menſtruum to be uſed for this is oil of turpentine; for neither ſpirit of wine, nor any lixivium, will do with it. There is another kind of ſanguis draconis called dragon's blood in tears, which, mixed with urine alone, gives a very elegant colour. *Philoſophical Tranſactions*, N°. 268.

Beſides theſe mixtures of colours and menſtruums, there are ſome colours which are to be laid on dry and unmixed. Theſe are dragon's blood, of the pureſt kind, for a red; gamboge for a yellow; green-wax for a green; common brimſtone, pitch, and turpentine, for a brown colour. The marble, for theſe experiments, muſt be made conſiderably hot, and then the colours are to be rubbed on dry in the lump. Some of theſe colours, when once given, remain immutable; others are eaſily changed or deſtroyed. Thus the red colour given by dragon's blood, or by a decoction of logwood, will be wholly taken away by oil of tartar, and the poliſh of the marble not hurt by it.

A fine gold colour is given in the following manner: take crude ſal armoniac, vitriol, and verdigris, of each equal quantities; white vitriol ſucceeds beſt, and all muſt be thoroughly mixed in fine powder.

The ſtaining of marble to all the degrees of red or yellow, by ſolutions of dragon's blood or gamboge, may be done by reducing theſe gums to powder, and grinding them, with the ſpirit of wine, in a glaſs mortar; but, for ſmaller attempts, no method is ſo good as the mixing a little of either of theſe powders with ſpirit of wine, in a ſilver ſpoon, and holding it over burning charcoal. By this means a fine tincture will be extracted, and, with a pencil dipped in this, the fineſt traces may be made on the marble, while cold, which, on the heating it afterwards, either on ſand, or in a baker's oven, will all ſink very deep, and will remain perfectly diſtinct in the ſtone. It is very eaſy to make the ground colour red or yellow by this means, and leave white veins in it. This is to be done by covering the places where the whiteneſs is to remain, with ſome white paint, or even with two or three doubles only of paper, either of which will prevent the colour from penetrating in that part. All the degrees of red are to be given to marble by means of this gum alone; a ſlight tincture of it, without the aſſiſtance of heat to the marble, gives only a pale fleſh colour, but the ſtronger tinctures give it yet deeper; to this the aſſiſtance of heat adds yet greatly; and, finally, the addition of a little pitch to the tincture gives it a tendency to blackneſs, or any degree of deep red that is deſired.

A blue colour may be given alſo to marble by diſſolving turnſol in a lixivium of lime and urine, or in the volatile ſpirit of urine; but this has always a tendency to purple, whether made by the one or the other of theſe ways. A better blue, and uſed in an eaſier manner, is furniſhed by the Canary turnſol, a ſubſtance well known among the dyers: this needs only to be diſſolved in water, and drawn on the place with a pencil; this penetrates very deep into the marble, and the colour may be increaſed by drawing the pencil, wetted afreſh, ſeveral times over the ſame lines. This colour is ſubject to ſpread and diffuſe itſelf irregularly; but it may be kept in regular bounds, by circumſcribing its lines with beds of wax, or any other ſuch ſubſtance. It is to be obſerved, that this colour ſhould be laid on cold, and no heat given afterwards to the marble; and one great advantage of this colour is, that it is therefore eaſily added to marble already ſtained with any other colours, and it is a very beautiful tinge, and laſts a long time. *Mem. Acad. Par.* 1732.

Arundel MARBLES, ancient marbles with a chronicle of the city of Athens inſcribed on them, many years before our Saviour's birth; preſented to the univerſity of Oxford by Thomas earl of Arundel, whence the name.

MARBLING, the method of preparing and colouring the marbled paper.

There are ſeveral kinds of marbled marble paper; but the principal difference of them lies in the forms in which the colours are laid on the ground: ſome being diſpoſed in whirles or circumvolutions; ſome in jagged lengths; and others in ſpots of a roundiſh or oval figure. The general manner of managing each kind is, nevertheleſs, the ſame; being the dipping the paper in a ſolution of gum-tragacanth, or, as it is commonly called, gum-dragon; over which the colours, previouſly prepared with ox-gall and ſpirit of wine, are firſt ſpread.

The peculiar apparatus neceſſary for this purpoſe, is a trough for containing the gum-tragacanth, and the colours; a comb for diſpoſing them in the figure uſually choſen; and a burning ſtone for poliſhing the paper. The trough may be of any kind of wood; and muſt be ſomewhat larger than the ſheets of paper, for marbling which it is to be employed; but the ſides of it need only riſe about two inches above the bottom; for by making it thus ſhallow, a leſs quantity of the ſolution of the gum will ſerve to fill it. The comb may be alſo of wood, and five inches in length; but ſhould have braſs teeth, which may be about two inches long, and placed at about a quarter of an inch diſtance from one another. The burniſhing ſtone may be of jaſper, or agate; but as thoſe ſtones are very dear, when of ſufficient largeneſs, marble or glaſs may be uſed, provided their ſurface be poliſhed to a great degree of ſmoothneſs.

Theſe implements being thus prepared, a ſolution of gum-tragacanth muſt be made, by putting a ſufficient proportion of the gum, which ſhould be white, and clear from all foulneſſes, into clean water; and letting it remain there a day or two, frequently breaking the lumps and ſtirring it, till the whole ſhall appear diſſolved, and equally mixed with the water. The conſiſtence of the ſolution ſhould be nearly that of ſtrong gum-water, uſed in miniature painting; and if it appear thicker, water muſt be added, or if thinner, more of the gum. When the ſolution is thus brought to a due ſtate, it it muſt be paſſed through a linen cloth, and then being put into the trough, it will be ready to receive the colours.

The colours employed for red are carmine, lake, roſe-pink, and vermillion; but the two laſt are too hard and glaring, unleſs they are mixed with roſe-pink, or lake, to bring them to a ſofter caſt: and with reſpect to the carmine and lake, they are too dear for common purpoſes: — for yellow, Dutch pink and yellow oker may be employed: — for blue, Pruſſian blue and verditer may be uſed: — for green, verdigriſe, a mixture of Dutch pink and Pruſſian blue, or verditer, in different proportions: — for orange, the orange-lake, or a mixture of vermillion, or red lead, with Dutch pink: — for purple, roſe-pink and Pruſſian blue.

Theſe ſeveral colours ſhould be ground with ſpirit of wine till they be of a proper fineneſs; and then, at the time of uſing them, a little fiſh-gall, or in default of it, the gall of a beaſt ſhould be added, by grinding them over again with it. The proper proportion of the gall muſt be found by trying them; for there muſt be juſt ſo much as will ſuffer the ſpots of colour, when ſprinkled on the ſolution of the gum-tragacanth, to join together, without intermixing or running into each other.

When every thing is thus prepared, the ſolution of the gum-tragacanth muſt be poured into the trough; and the colours, being in a ſeparate pot, with a pencil appropriated to each, muſt be ſprinkled on the ſurface of the ſolution, by ſhaking the pencil, charged with its proper colour over it; and this muſt be done with the ſeveral kinds of colour deſired, till the ſurface be wholly covered.

When the marbling is propoſed to be in ſpots of a ſimple form, nothing more is neceſſary; but where the whirles or ſnail-ſhell figures are wanted, they muſt be made by means of a quill; which muſt be put among the ſpots to turn them about, till the effect be produced. The jagged lengths muſt be made by means of the comb above deſcribed, which muſt be paſſed through the colours from one end of the trough to the other; and will give them that appearance; but if they be deſired to be pointed both ways, the comb muſt be again paſſed through the trough in a contrary direction; or if ſome of the whirles or ſnail-ſhell figures be required to be added, they may be yet made by the means before directed.

The paper ſhould be previouſly prepared for receiving the colours, by dipping it over night in water; and laying the ſheets on each other with a weight over them. The whole being thus ready, the paper muſt be held by two corners, and laid in the moſt gentle and even manner on the ſolution covered with the colours; and there ſoftly preſſed with the hand, that it may bear every where on the ſolution. After which it muſt be raiſed and taken off with the ſame care, and then hung to dry acroſs a proper cord, ſubtended near at hand for that purpoſe: and in that ſtate it muſt continue, till it be perfectly dry. It then remains only to give the paper a proper poliſh; in order to which it is firſt rubbed with a little ſope; and then muſt be thoroughly ſmoothed by the glaſs poliſhers, ſuch as are uſed for linen, and called the calender glaſſes. After which it ſhould be again rubbed by a burniſher of jaſper or agate; or, in default of them, of glaſs ground to the higheſt poliſh: for on the perfect poliſh of the paper depends in a great meaſure its beauty and value.

Gold or ſilver powders may be uſed, where deſired, along with the colours; and require only the ſame treatment as them, except that they muſt be firſt tempered with gum-water.

Marbling of books or paper is performed thus: diſſolve four ounces of gum-arabic into two quarts of fair water; then provide ſeveral colours mixed with water in pots or ſhells, and with pencils peculiar to each colour, ſprinkle them by way of intermixture upon the gum-water, which muſt be put into a trough, or ſome broad veſſel; then with a ſtick curl them, or draw them out in ſtreaks, to as much variety as may be done. Having done this, hold your book or books cloſe together, and only dip the edges in, on the top of the water and colours, very lightly; which done, take them off, and the plain impreſſion of the colours in mixture will be upon the leaves; doing as well the ends as the front of the book in the like manner.

Marbling a book on the covers is performed by forming clouds with aqua fortis, or ſpirit of vitriol mixed with ink, and afterwards glazing the covers. See the article Book-Binding.

MARCASITES, *Marchaſitæ*, in natural hiſtory, are defined to be compound inflammable metallic bodies, of a hard and ſolid ſubſtance, of an obſcurely and irregularly foliaceous ſtructure, of a bright glittering appearance, naturally conſtituting whole ſtrata, though ſometimes found in detached maſſes; very freely giving fire with ſteel; not fermenting with acid menſtruums; and when put into the fire, yielding a blue ſulphureous flame, and afterwards calcining into a purple powder.

There are only three known ſpecies of this genus: 1. The ſilver-coloured marcaſite, found in vaſt abundance in lead and tin-mines. 2. The gold-coloured marcaſite. 3. The heavy pale-white marcaſite.

Marcaſites were at firſt ſuppoſed to be almoſt all pure gold or ſilver, according to their colour: but experience has ſhewn, that if they contain any metal at all, no method has hitherto been found of working them to advantage. In Germany, indeed, they extract ſulphur and vitriol from the ſilver marcaſite, which two ſubſtances are always contained in it; and beſides theſe, it has uſually a quantity of arſenic. It has been recommended as a ſtyptic, after being calcined; but as the arſenic may not be all carried off by that operation, its uſe as a medicine ſeems extremely dangerous.

MARCGRAVE, or Margrave, a degree of honour in Germany anſwering to our marquis. See the article Marquis.

MARCGRAVIA, in botany, a genus of plants whoſe corolla is monopetalous and of a conico-ovate figure; the ſtamina are numerous, and the fruit is a globoſe coriaceous berry, with a number of cells containing a great many ſmall ſeeds wrapped in a ſoft pulp.

MARCH, in chronology, the third month in the year, conſiſting of thirty-one days. See the articles Month and Year.

MARCIONITES, Chriſtian heretics in the ſecond century, thus denominated from their leader Marcion, who maintained, that their were two principles or Gods, a good and a bad one. Origen affirms, that he held there was a God of the Jews, a God of the Chriſtians, and a God of the Gentiles. It is ſaid that he denied the reſurrection of the body, condemned marriage, and taught that our Saviour, when he deſcended into hell, diſcharged Cain, the Sodomites, and other impious wretches, out of that place of torment. He rejected all the Old Teſtament, and received only part of St. Luke's Goſpel, and ten of St. Paul's Epiſtles, in the New.

MARCOSIANS, a ſect of Chriſtian heretics in the ſecond century, ſo called from their leader Marcus, who repreſented the ſupreme God as conſiſting not of a trinity, but a quaternity, viz. the ineffable, ſilence, the father, and truth. He held two principles, denied the reality of Chriſt's ſufferings, and the reſurrection of the body, and had the ſame fancies concerning the æons as Valentinus. See the articles Æons and Valentinians.

The marcoſians, it is ſaid, made pretences to greater perfection than either St. Paul or St. Peter; and being perſuaded that nothing could hinder their ſalvation, freely indulged themſelves in the practice of vice.

MARDIKERS, or Topasses, a mixed breed of Dutch, Portugueſe, Indians, and other nations, incorporated with the Dutch at Batavia, in the Eaſt-Indies.

MARE, the female of the horſe-kind. See the article Horse.

Such mares as are deſigned for breeding, ought to be as free from defects as poſſible, and ſhould, no more than the ſtallions, have either moon-eyes, watery-eyes, or bloodſhot-eyes; they ſhould have no ſplint, ſpavin, or curb, nor any natural imperfection; for the colts will take after them: but choice ſhould be made of the beſt and ableſt, the moſt high ſpirited, beſt coloured, and fineſt ſhaped; and the natural defects that may be in the ſtallion, ſhould be amended in the mare, as well as that which is amiſs in the mare ſhould be amended in the ſtallion.

As for her age, ſhe may be covered when three years old; but the moſt convenient time is after four, when ſhe will nouriſh her colt beſt; and tho' ſhe may breed till ſhe is thirteen, yet ſhe is not fit for it when ſhe is paſt ten, for the colt of an old mare is commonly heavy. Before a mare is covered; ſhe ſhould be in the houſe about ſix weeks, during which time ſhe ſhould be well fed with good hay and oats well ſifted; and in order to render her conception the more certain, near a quart of blood may be taken from each ſide of her neck, about five or ſix days before covering. Another method to bring a mare in ſeaſon and make her retain, is to give her, for the ſpace of eight days before you bring her to the horſe, about two quarts of hempſeed in the morning, and as much at night; and if ſhe refuſes to eat it, to mingle it with a little bran or oats, or elſe to let her faſt for a while: and if the ſtallion alſo eat of it, it will greatly contribute to generation.

Mares go with foal eleven months and as many days as they are years old; and therefore the propereſt time for covering them is in the beginning of June, that ſhe may foal the May following, when there will be plenty of graſs, which will afford the mares a great abundance of milk for nouriſhing their foals: but a mare ſhould never be covered while ſhe is bringing up her foal, becauſe the foal to which ſhe is giving ſuck, as well as that in her belly, will be prejudiced by it, and ſhe herſelf ſooner ſpent. After covering, let her, for three weeks or a month, have the ſame diet as before, and be kept clean in the ſtable till the middle of May, with her feet well pared and thin ſhod: take her in again about the latter end of September, if not before, and keep her to the end of her foaling. If ſhe cannot readily bring forth, hold her noſtrils ſo as to ſtop her taking wind; and if that will not do, diſſolve madder, to the quantity of a walnut, in a pint of ale, and give it her warm. In caſe ſhe cannot void her ſecundine, or after-burden, boil two or three handfuls of fennel in running-water, then put half a pint of that liquor into as much ſack, or, for want thereof, into a pint of ale, with a fourth part of ſallad-oil, mixed together, and pour it luke-warm into her noſtrils, holding them cloſe for ſome time: otherwiſe give her green wheat, or rye, the laſt of which is beſt.

If the mare has but little milk, boil as much as you can get from her, with the leaves of lavender and ſpike, and bathe the udder with it warm, till the knobs and knots are diſſolved. She ſhould now drink only white water (which is bran put into water;) give her alſo ſweet maſhes: and a month after foaling let her have a maſh with ſome brimſtone or ſavin in it.

MARIGOLD, in botany. See CALENDULA.

African MARIGOLD. See TAGETES.

Corn MARIGOLD. See CHRISANTHEMUM.

Fig MARIGOLD. See MESEMBRYANTHEMUM.

French MARIGOLD. See TAGETES.

Marſh MARIGOLD. See CALTHA.

MARJORAM, in botany. See MAJORANA and ORIGANUM.

MARITIME, ſomething relating to, or bounded by the ſea: thus, a maritime province, or country, is one bounded by the ſea; and a maritime kingdom, or ſtate, is one that makes a conſiderable figure, or is very powerful, at ſea.

MARK, in commerce, a certain note which a merchant puts upon his goods, or upon the caſk, hogſhead, &c. that contains them, in order to diſtinguiſh them from others.

St. MARK *the Evangeliſt's Day*, a feſtival of the Chriſtian church, obſerved April 25.

St. MARK'*s Goſpel*, a canonical book of the New Teſtament, being one of the four Goſpels.

St. Mark wrote his Goſpel at Rome, where he accompanied St. Peter, in the year of Chriſt 44. Tertullian and others pretend, that St. Mark was no more than an amanuenſis to St. Peter, who dictated this Goſpel to him; others affirm that he wrote it after St. Peter's death. Nor are the learned leſs divided as to the language this Goſpel was wrote in; ſome affirming it was compoſed in Greek, others in Latin. Several of the ancient heretics received only the Goſpel of St. Mark; others among the Catholics, rejected the twelve laſt verſes of this Goſpel. The Goſpel of St. Mark is properly an abridgment of that of St. Matthew.

MARK, or MARC, alſo denotes a weight uſed in ſeveral ſtates of Europe, and for ſeveral commodities, eſpecially gold and ſilver. In France, the mark is divided into eight ounces, or ſixty-four drams, or one hundred and ninety-two deniers, or penny-weights, or one hundred and ſixty eſterlines, or three hundred mailles, or ſix hundred and forty felins, or four thouſand ſix hundred and eight grains. In Holland, the mark-weight is alſo called troy-weight, and is equal to that of France. When gold and ſilver is ſold by the mark, it is divided into twenty-four caracts. See the article CARACT.

MARK, is alſo uſed among us for a money of account, and in ſome other countries for a coin.

The Engliſh mark is two-thirds of a pound ſterling, or thirteen ſhillings and four-pence; and the Scotch mark is of equal value in Scotch money of account. The mark-lubs, or Lubec-mark, uſed at Hamburg, is alſo a money of account, equal to one-third of the rix-dollar, or to the French livre; each mark is divided into ſixteen ſols-lubs. Mark-lubs is alſo a Daniſh coin equal to ſixteen ſols-lubs. Mark is alſo a copper and ſilver coin in Sweden. See the article EXCHANGE.

MARKET, a public place in a city or town in which live cattle, proviſions, or other goods, are ſet to ſale; and alſo a privilege, either by grant or preſcription, by which a town is enabled to keep a market.

MARLE, *Marga*, a kind of dry, ſoft, foſſile earth, uſed for manuring land.

The word is derived from the old Celtic *marga*, mentioned by Pliny, and afterwards called margilla.

The principal ſorts of marle are the white and red. Too much of it thrown on the ground is found to burn it. Marle is burnt like other ſtone for making of lime.

It is a very material circumſtance in the marling of land, to find out how much the land requires of this manure; and, till experience has thoroughly ſhewn this, it is better to err in laying on too little than too much; becauſe the latter is a fault not to be remedied. It is to be obſerved alſo, that marle never makes ſo great an improvement on land the firſt year, as it does afterwards.

Dice MARLE, in huſbandry, a name given by the people of Staffordſhire to a reddiſh marle, that breaks into ſmall ſquare pieces like dice, or elſe into thin flakes, in the manner of lead ore, and looks ſmooth on the ſurface.

MARLINE, amongſt ſeamen, a ſmall cord or line, uſed to faſten the ſtrops of blocks, &c. See BLOCK.

MARLINE-SPIKE, a kind of iron pin, with a large head, and tapering at the other end to a point. It is employed to penetrate the twiſts or ſtrands of rope in the time of ſplicing, &c. which is joining the end of one rope to another. See the article SPLICE.

The marline-ſpike is alſo uſed for many other purpoſes of a ſimilar nature.

MARMALADE, a confection of plums, apricots, quinces, &c. boiled with ſugar to a proper conſiſtence.

MARMOR, marble. See MARBLE.

MARMOTTE, in zoology, the largeſt animal of the mus or rat kind, with a long naked tail and tawney body; it is near as big as a hare, and breeds only on the tops of mountains in Switzerland. Its feet are ſomewhat like thoſe of a bear.

MARONITES, in church hiſtory, a ſect of Chriſtians near mount Libanus in Syria, who are in communion with the church of Rome, and have their patriarch, archbiſhops, biſhops, &c.

MARQUE, or *Letters of* MARQUE, in military affairs, are letters of repriſal, granting the ſubjects of one prince or ſtate liberty to make repriſals on thoſe of another.

Letters of marque, among us, are extraordinary commiſſions granted by authority, for reparation to merchants, taken by ſtrangers at ſea; and repriſals is only the retaking or taking of one thing for another.

MARQUETRY, or INLAID-WORK, is a curious work compoſed of ſeveral fine pieces of wood, of various colours, faſtened in thin ſlices on a ground, and ſometimes enriched with other matters, as ſilver, braſs, tortoiſe-ſhell, and ivory; with theſe aſſiſtances the art is now capable of imitating any thing; whence it is by ſome called the art of painting in wood.

The ground on which the pieces are to be arranged and glued, is uſually of well-dried oak or deal, and is compoſed of ſeveral pieces glued together, to prevent its warping. The wood to be uſed in marquetry is reduced into leaves of the thickneſs of a line, or the twelfth part of an inch, and is either of its natural colour, or ſtained, or made black to form the ſhades by other methods: this ſome perform by putting it in ſand heated very hot over the fire; others, by ſteeping it in lime-water and ſublimate; and others, in oil of ſulphur. The wood being of the proper colours, the contours of the pieces are formed according to the parts of the deſign they are to repreſent: this is the moſt difficult part of marquetry, and that which requires the moſt patience and attention.

The leaves to be formed, of which there are frequently three, four, or more joined together, are, after they have been glued on the outermoſt part of the deſign, whoſe profile they are to follow, put within the chaps of the vice; then the workman preſſing the treddle, and thus holding faſt the piece, with his ſaw runs over all the out-lines of his deſign. By thus joining or forming three or four pieces together, not only time is ſaved, but alſo the matter is the better enabled to ſuſtain the efforts of the ſaw, which, how fine ſoever it may be, and how ſlightly ſoever it may be conducted by the workman, except this precaution were taken, would be apt to raiſe ſplinters, and ruin the beauty of the work. All the pieces having been thus formed by the ſaw, and marked, in order to their being known again, each is vaneered, or faſtened in its place, on the common ground, with the beſt Engliſh glue; and this being done, the whole is ſet in a preſs to dry, planed over, and poliſhed with the ſkin of the ſea dog, wax, and ſhave-graſs, as in ſimple vaneering, and the fine branches and more delicate parts of the figures are touched up and finiſhed with a graver.

MARQUIS, a title of honour, next in dignity to that of duke, firſt given to thoſe who commanded the marches, that is, the borders and frontiers of countries.

Marquiſſes were not known in England till king Richard II. in the year 1337, created his great favourite, Robert Vere, the earl of Oxford, marquis of Dublin; ſince which time there have been many creations of this ſort, though at preſent there is but one Engliſh and two Scotch marquiſſes. The manner of creating a marquis differs in nothing from that of a duke, except the difference of the titles, and the marquis's being conducted by a marquis and an earl, while a duke is led by a duke and a marquis;

quis; he is alſo girt with a ſword, has a gold verge put into his hand, and his robe or mantle is the ſame as thoſe of a duke, with only this difference, that a duke's mantle has four guards of ermine, and a marquis's only three and a half. The title given him, in the ſtyle of the heralds, is moſt noble and potent prince. His cap is the ſame as a duke's, and the difference between their coronets conſiſts in the duke's being adorned with only flowers or leaves, while the marquis's has flowers and pyramids with pearls on them, intermixed, to ſhew that he is a degree between a duke and an earl.

MARRIAGE, a contract both civil and religious, between a man and a woman, by which they engage to live together in mutual love and friendſhip, for the ends of procreation, &c.

MARROW, *Medulla*, in anatomy, has various ſignifications: the white ſubſtance of the brain, in contradiſtinction from the cortical part, is called the ſpinal marrow; but, properly, marrow denotes that ſoft oleaginous ſubſtance contained in the cavity of the bones.

Every bone in the body of any conſiderable thickneſs, has either a large cavity, or is full of little cells; in both the one and the other is marrow contained in proper veſicles that open into one another.

In the larger bones this fine oil, by the gentle heat of the body, enters ſome narrow paſſages, which lead to certain fine canals excavated in the ſubſtance of the bone; and from theſe other croſs paſſages, not directly oppoſite to the former, carry the marrow ſtill farther into more longitudinal canals placed nearer the ſurface of the bone. All this contrivance is, that the marrow may ſupple the fibres of the bones, and render them leſs apt to break.

By latter obſervations, blood-veſſels have been found in the bones, ſo that they are nouriſhed in the ſame manner as the other parts of the body. Beſides we find that many bones grow, and yet have no marrow in them, as the horns of deer, lobſters claws, &c.

All marrows are mollifying, rarefying, give relief by friction under laſſitudes and incarnate ulcers.

MARRUBIUM, hore-hound, in botany, a genus of plants, whoſe flower is monopetalous and labiated, the upper lip of which is erect, ſemibifid, and acute, and the under lip reflexed and cut into three ſegments, the ſeeds are four and contained in the cup. The common hore-hound, has a woody fibrous roots from which ariſe ſeveral hairy ſquare ſtalks which are furniſhed with hoary roundiſh leaves, wrinkled and crenated on their edges; the flowers proceed in whorles from the joints of the ſtalks in June, and are of a white colour, the whole plant has a ſtrong diſagreeable ſmell, and grows wild in many parts of England: it is aperient and powerfully reſolves viſcid humours, and by ſome is accounted a ſpecific in moiſt aſthma's, and in all diſeaſes of the breaſt and lungs: the doſe in infuſion is from half a handful, to a handful, the dried leaves may be given to a dram or two.

MARS, in aſtronomy, one of the ſuperior planets, moving round the ſun in an orbit between thoſe of the earth and Jupiter. See the article PLANET.

For the diameter of this planet, and its mean diſtance from the ſun, ſee the articles DIAMETER and DISTANCE.

The character of this planet is ♂, the excentricity of its orbit 141, ſuppoſing the diſtance of the earth from the ſun 1000 equal parts; the inclination of its orbit to that of the earth is 1° 51′; the periodical time in which it performs its revolution round the ſun, is 686 days, 23 hours, 27′ 30″; its revolution round its own axis 24 hours 40′; and its parallax, 30″. See the articles CHARACTER, EXCENTRICITY, &c.

In the achronical riſing of this planet, that is, when it is in oppoſition to the ſun, it is found twice as near the earth as the ſun, which is a phænomenon that has greatly diſcredited the Ptolemaic hypotheſis. This planet, as well as the reſt, borrows its light from the ſun and has its increaſe and decreaſe of light like the moon; and it may be ſeen almoſt biſſected when in its quadratures with the ſun, or its perigæon; but is never corniculated or falcated, as the inferior planets.

Dr. Hook, in 1665, obſerved ſeveral ſpots in this planet, which having a motion, he concluded the planet to have a turbinated motion round its center. In 1666, M. Caſſini obſerved ſeveral ſpots in the two hemiſpheres of Mars, which by continuing his different obſervations very diligently, he found to move by little and little from eaſt to weſt, and to return in the ſpace of 24 hours 40′ to their former ſituation. Whence both the motion and period or natural day of that planet were determined. See the article MACULÆ.

Mars always appears with a ruddy troubled light, whence we conclude that it is incompaſſed with a thick cloudy atmoſphere, which by diſturbing the rays of light in their paſſage and re-paſſage through it, occaſion that appearance. Beſides the ruddy colour of Mars, we have another argument of his being incompaſſed with an atmoſphere, and it is this, that when any of the fixed ſtars are ſeen near his body, they appear extremely obſcured and almoſt extinct; and if this be the caſe, a ſpectator in Mars woud ſcarce ever ſee Mercury, unleſs perhaps in the ſun at the time of conjunction, when Mercury paſſes over his diſk, as he ſometimes appears to us in form of a ſpot. An eye in Mars will ſee Venus at about the ſame diſtance from the ſun as Mercury appears to us, and the earth about the ſame diſtance from the ſun that Venus appears to us; and when the earth is found in conjunction with and very near the ſun, the eye in Mars will ſee the earth horned or falcated, and its attendant, the moon, of the ſame figure, and at its utmoſt diſtance from the earth not above fifteen minutes of a degree: and as this planet's diſtance from the ſun is to the diſtance of the earth and ſun as $1\frac{1}{2}$ to 1; therefore a ſpectator in Mars would ſee the ſun's diameter leſs by one third than it appears to us, and conſequently the degree of light and heat which Mars receives from the ſun, is leſs by one third than that received by the earth; this proportion will however, admit of a ſenſible variation, on acccount of the great excentricity of this planet.

Though the period or year of this planet as has been already obſerved, is nearly twice as long as ours, and his natural day, or the time in which the ſun appears above his horizon, ſetting aſide the conſideration of twilight, is almoſt every where equal to his night; yet it appears that in one and the ſame place, on his ſurface, there will be but very little variety of ſeaſons, or ſcarce any difference of ſummer and winter: and the reaſon is that the axis of his diurnal rotation is nearly at right angles with the plane of his orbit. It will be found notwithſtanding, that places ſituated in different latitudes, that is, at different diſtances from his equator, will have very different degrees of heat, on account of the different inclination of the ſun's rays to the horizon, as it is with us when the ſun is in the equinoxes.

From this conſideration Dr. Gregory endeavours to account for the appearance of the faſciæ in Mars, which are certain ſwaths or fillets ſeen in this planet, and poſited parallel to his equator; for as among us, the ſame climate has at different ſeaſons very unequal degrees of heat, but as in Mars it is otherwiſe, the ſame parallel having always a pretty equable degree of heat, it follows that theſe ſpots may probably be formed in Mars, or in his atmoſphere, as ſnow and clouds are in ours, viz. by the conſtant different intentions of heat and cold in the different parallels, and ſo come to be extended in circles or belts parallel to his equator, or the circle of his diurnal motion. And this ſame principle may, perhaps ſolve the phœnomenon of Jupiter's belts, that planet, like Mars, having a perpetual equinox. See the article JUPITER.

MARS, among chemiſts, denotes iron, as being ſuppoſed to be under the influence of that planet. See the article IRON.

Crocus of MARS. See CROCUS MARTIS.

MARINE implies in general the whole navy of a kingdom or ſtate, comprehending all the royal dock-yards, and the officers, artificers, ſeamen, ſoldiers, &c. employed therein, as well as the ſhipping employed by the merchants for military or commercial purpoſes, together with whatever relates to navigation, ſhip-building, ſailors, and marines.

The hiſtory of the marine affairs of any one ſtate is a very comprehenſive ſubject, much more that of all nations. Thoſe who would be informed of the maritime affairs of Great Britain, and the figure it has made at ſea in all ages, may find abundance of curious matter in Selden's *Mare Clauſum*, and from his time to ours, we may trace a ſeries of facts in Lediard's and Burchet's Naval Hiſtory; but above all, in the Lives of the Admirals, by the accurate and judicious Dr. Campbell.

Not only the preſervation of that ſhare of commerce we at preſent poſſeſs, but its future advancement, and even the very being of Britain, as an independent empire, and a free people, depend no leſs on the good condition and the wiſe regulation of our affairs of the marine, than on the ſuperiority of its naval power. The Delphian oracle being conſulted by the Athenians on the formidable armament and innumerable forces of Xerxes, returned for anſwer, "that they muſt ſeek their ſafety in wooden walls." To which we may affirm, that whenever this nation in particular has recourſe to her floating bulwarks for her ſecurity and defence, ſhe will find ſtrength, wealth, and glory, to be the happy and infallible conſequence.

That the legiſlature has ever been attentive to this great and important object will appear from the following account of the laws that have been enacted relating to the affairs of the Britiſh marine.

So early as 5 Rich. II. c. 3. it was enacted, that none of the king's ſubjects ſhould bring in or carry out any merchandize, but in Engliſh ſhips, on pain of forfeiting all the merchandize otherwiſe conveyed, or the value thereof; but 6 Rich. II. ordains, that the above ſtatute ſhall only take place where able ſhips belonging to the king's ſubject are to be found; for where they are not to be had, the merchants are allowed to hire other ſhips. By 4 Hen. VII. c. 10. it was enacted, that no Gaſcoign or Guieune-wines, &c. ſhould be imported into this realm but in Engliſh veſſels: and that none ſhould freight any merchandize in any ſtranger's ſhip, if he could have ſufficient freight in a denizen's ſhip, under the penalty of forfeiting all merchandize not thus ſhipped, to be divided between the king and the ſeizer: but this act, ſo far as it related to the above wines, was repealed by ſtatute 32 Hen. VIII. c. 14. and a rate was ordered of what ſhould be paid for the frieght of the ſeveral ſorts of merchandize in ſhips from the port of London to other places, and from thence to London. By 1 Eliz. c. 13. it was enacted, that if the owner of any merchandize ſhould in the time of peace, embark or unload any part thereof, (maſts, pitch, tar and corn, only ex-out of, or into any foreign ſhip, he ſhould pay cuſtom as an alien.

By the act of navigation, 12 Car. II. c. 18. it is enacted, that no goods ſhall be imported into, or exported out of, any territories belonging to, or that may hereafter belong to his majeſty, his heirs and ſucceſſors, in Aſia, Africa, or America, in any other ſhips beſides ſuch as belong to the people of England, Ireland, Wales, or the town of Berwick upon Tweed, and whereof the maſter and three-fourths of the mariners are Engliſh, on pain of forfeiting both the ſhip and lading, one third part to the king, another to the governor of the country where ſuch default ſhall be, if ſeized there, otherwiſe that third alſo to the king, and the other third to him that will ſeize or ſue for the ſame. And commanders at ſea, having the king's commiſſion, are to bring in as prize all ſuch ſhips, and on their being condemned, one moiety is to be for the uſe of ſuch commanders and their companies, and the other moiety to the king. No goods of the growth or manufacture of Muſcovy, or of the produce of the Turkiſh empire, ſhall be imported into England, Ireland, &c. in any ſhip or veſſel not Engliſh built, or not belonging to the people of England, Ireland, &c. and navigated as aforeſaid; except veſſels built at the place from whence the goods came, or of ſuch port where they can only be, and uſually are ſhipped, on pain of forfeiting the ſhip and goods; and all wines of the growth of France and Germany, and divers goods and merchandize from Spain, Portugal, Ruſſia, &c. which ſhall be imported into the places aforeſaid, in any other ſhip than what doth belong to England, Ireland, &c. and are navigated as aforeſaid, ſhall be deemed aliens goods, and pay accordingly. And no foreign built veſſel ſhall paſs as a ſhip belonging to England, Ireland, Wales, &c. till the owner makes it appear to the chief officer of the cuſtoms, in the port next to the place of his abode, that he is not an alien, and takes an oath that it was *bona fide* bought of ſuch perſons, expreſſing the ſum given, and the time and place when and where, &c. and that no foreigner has a ſhare in it. Alſo none ſhall load in any bottom, if ſtrangers or owners, part-owners, or maſter, and of which three-fourths of the mariners at leaſt are not Engliſh, any goods whatſoever from one port or creek of England, Ireland, Wales, Guernſey, Jerſey, or the town of Berwick, to another port of the ſame, on pain of forfeiting ſuch goods and veſſel.

The 22 and 23 Car. II. c. 11. ordains, that where any goods ſhall be laden on board only Engliſh ſhip of the burden of two hundred tons, or upwards, and mounted with ſixteen guns or more, if the maſter yields up ſuch ſhip or goods to any Turkiſh veſſel, or any pirate, without fighting, upon proof thereof in the admiralty, he ſhall be incapable of taking charge of any Engliſh veſſel: and maſters of Engliſh ſhips, though not of that burden, nor mounted as aforeſaid, that ſhall yield without fighting to a Turkiſh ſhip or pirate, that has not at leaſt double the number of guns, ſhall be liable to the penalties of this act. If any inferior officers or mariners of a ſhip, ſhall refuſe to fight when commanded, or utter words to diſcourage others, they ſhall loſe all their wages due, and be impriſoned not exceeding ſix months; and mariners laying violent hands on their commanders, to hinder them from fighting in defence of their ſhips, ſhall ſuffer death as felons. When any Engliſh ſhip ſhall have been defended by fight, and brought to her port, in which fighting any of her men have been wounded or ſlain, the judge of the admiralty, or his ſurrogate, &c. where ſhe ſhall arrive, upon the petition of the maſter and ſeamen, may call ſo many as he ſhall be informed are the adventurers and owners, and by adviſing with them, levy upon the reſpective owners ſuch ſums as he himſelf, and the major part of them preſent, ſhall judge reaſonable, not exceeding two per cent of the ſhip and goods; which money ſhall be diſtributed among the maſter, officers, and ſeamen, or the widows and children of the ſlain, according to the direction of the judge, with the approbation of three or more of the adventurers. By 5th and 6th of William and Mary, c. 24. every perſon who ſhall build, or cauſe to be built, any ſhip of three decks, containing 450 tons, and mounted with thirty-two pieces of ordnance, having ammunition, &c. proportionable, ſhall for the firſt three voyages which the ſaid ſhip ſhall make to any foreign parts, receive a tenth of the cuſtoms called the ſubſidy of tonnage and poundage, payable for merchandize exported and imported in ſuch ſhips; but if after the end of the three firſt voyages, ſhips ſo built, ſhall be altered ſo as to become leſs defenſible than they were at firſt, then they ſhall be forfeited and loſt.

By 2 Ann. c. 9. owners of ſhips might navigate during the war with France, with maſters, and only one half of the mariners Engliſh: and by 3 and 4 Ann. c. 13. any ſhips might be navigated by foreign ſeamen; and foreigners ſerving on board any Engliſh ſhip for two years, were to be deemed natural-born ſubjects, &c.

By 4 Geo. I. c. 12. and 11 Geo. I. c. 29. if any officer or mariner belonging to any ſhip or veſſel, ſhall wilfully caſt away, burn, or deſtroy the ſhip to which he belongeth, or in any-wiſe direct or procure the ſame to be done, with intent to prejudice a perſon that ſhall have granted any inſurance thereon, or any merchant who ſhall load goods therein, or any owner of ſuch veſſel, the perſons offending ſhall on conviction be adjudged guilty of felony without benefit of clergy.

The 5th of Geo. II. c. 20. enacts, that no commander of any ſhip outward-bound ſhall receive on board any gun-powder, either as merchandize or ſtores for the voyage, except for his majeſty's ſervice, before ſuch ſhip ſhall be at Blackwall, in the river Thames; and all maſters of ſhips coming into the river, ſhall put on ſhore all powder either before the arrival of their ſhips at the ſaid place, or within twenty-four hours after they come to anchor there, upon pain of forfeiting 5l. for every 50 pounds weight of gun-powder on board, and in like proportion for a leſs quantity. And no guns ſhall be kept loaded with ſhot in merchant ſhips between London-bridge and Blackwall, or fired before the riſing, or after the ſetting of the ſun, under the penalty of 5 l. and for every gun ſo fired, 10 s. And if any pitch, tar, roſin, or other combuſtible matter ſhall be heated or melted by fire in any ſhips, every perſon ſo offending, ſhall, for every offence, forfeit 5 l. And ſhips are liable to be ſearched by an elder brother, appointed by the maſter, wardens, and aſſiſtants of the Trinity-houſe at Deptford. In caſe any ſhip ſhall be moored in the mouth or at any other part of St. Saviour's dock, except ſuch ſhips as ſhall be loading or delivering their cargoes, and others, not exceeding two at a time, that ſhall lie at Shipwright-yard, at the north-weſt corner of the ſaid dock, during the time they ſhall be repairing, the maſter of ſuch ſhip ſhall forfeit 20 s. for every day ſhe ſhall continue to be laid up and moored.

By 6 Geo. II. c. 29. maſters of ſhips lying in the river Thames who have occaſion for ballaſt, ſhall pay 1 s. per ton colliers, other ſhips 1 s. 3d. and foreign ſhips 1 s. 7 d. per ton, to the corporation of the Trinity-houſe at Deptford; who ſhall pay ballaſt-men 9 d. a ton, for raiſing and carrying it, &c. and it ſhall be lawful for any maſter of a ſhip to appoint two perſons to go on board any lighter bringing ballaſt to ſuch ſhips, to inſpect the marks thereof; and every ballaſt-man ſhall immediately before the delivery of ballaſt to any ſhip, trim ſuch lighter, ſo as to make it ſwim at equal marks at the ſtem and ſtern, and pump all the water out, &c. and the maſter, wardens, and aſſiſtants of the Trinity-houſe, are to make good to the maſter, the quantity or value of the ballaſt which ſhall be found deficient, or forfeit 50 l. one moity to the poor, and the other to the perſon ſuing for it. The 7th of Geo. II. c. 15. ordains, that no owners of ſhips ſhall be liable to any loſs by reaſon of embezzlement by the maſter or mariners, of any goods ſhipped on board, or for any act done by them, without the privity or knowledge of ſuch owners, further than the value of the ſhip, and amount of the freight during the voyage, in which ſuch embezzlement of the maſter or mariners ſhall be committed; and if ſeveral perſons ſhall ſuffer damage by the means aforeſaid, and the value of the ſhip and cargo ſhould not be ſufficient to make compenſation, then the freighters ſhall receive ſatisfaction in average, in proportion to their reſpective loſſes, to be aſcertained on a bill in equity, exhibited for a diſcovery thereof, and of the value of ſuch ſhip and freight. But nothing in this act ſhall diſcharge any remedy, which any perſon may have againſt the maſter and mariners, in reſpect of an embezzlement. See the articles FREIGHT, INSURANCE, &c.

MARINES, or MARINE FORCES, a body of ſoldiers raiſed for the ſea-ſervice, and trained to fight either in a naval engagement, or in an action aſhore.

The great ſervice of this uſeful corps was manifeſted frequently in the courſe of the late war, particularly at the ſiege of Belleiſle, where they acquired a great character, although lately raiſed, and hardly exerciſed in military diſcipline. At ſea they are incorporated with the ſhip's crew, of which they make a part, and many of them learn in a ſhort time to be excellent ſeamen, to which their officers are ordered by the admiralty not to diſcourage them, although no ſea-officer is to order them to go aloft againſt their inclination. In a ſea-fight tyeir ſmall arms are of very great advantage in ſcouring the decks of the enemy; and when they have been long enough at ſea to ſtand firm when the ſhip rocks, they muſt be infinitely preferable to ſeamen if the enemy attempts to board, by fraiſing a battalion with their fixed bayonets to oppoſe him. See the article BOARDING.

The marine forces of Great-Britain in the time of peace are ſtationed in three diviſions; one of which is quartered at Chatham, one at Portſmouth, and another at Plymouth. By a late regulation they are ordered to do duty at the ſeveral dock-yards of thoſe ports, to prevent embezzlement of the king's ſtores, for which a captain's guard mounts every day; which certainly requires great vigilance, as ſo many abuſes of this kind have been committed, that many of the inhabitants, who have been long uſed to an infamous traffic of this kind, expect theſe conveyances at certain periods, as their due, and of courſe reſent this regulation in the higheſt degree as an infringement of their liberty as Engliſhmen.

MARSHAL, in its primary ſignification, means an officer who has the command or care of horſes; but it is now applied to officers who have very different employments, as earl marſhal, knight-marſhal, or marſhal of the king's houſe, &c.

MARSHAL, or MARESCHAL, *of France*, an officer of the greateſt dignity in the French armies. When two or more mareſchals are in the army, the eldeſt commands.

MARSHALLING a coat, in heraldry, is the diſpoſal of ſeveral coats of arms belonging to diſtinct families, in one and the ſame eſcutcheon or ſhield, together with their ornaments, parts, and appurtenances.

MARSHMALLOW, in botany. See the article ALTHÆA.

MARSHY LANDS, thoſe liable to be over flowed ed by the ſea, or large rivers, for the draining of which, ſee the articles DITCH, DRAIN, &c.

MARSILEA, in botany, a genus of plants of the fern kind ; the flowers are male and female, but without cup or corolla ; the male flower conſiſts of four ſubulated antheræ, and placed on a hemiſpherical-convex body ; the female flower conſiſts of a roundiſh pericarpium with four cells, in each of which are contained ſeveral roundiſh ſeeds. Under this genus is comprehended the ſalvinia of Micheli.

MARSUPIALIS MUSCULUS, in anatomy, a muſcle otherwiſe called the internal obturator. See OBTURATOR.

MARTIAL, among phyſicians, an appellation given to the preparations of iron.

MARTIAL LAW, is the law of war, which entirely depends on the arbitrary power of the prince, or of thoſe to whom he has delegated it : for though the king can make no laws in time of peace without the conſent of parliament, yet in time of war he uſes an abſolute power over the army.

MARTIN, *Martes*, in zoology, a ſpecies of muſtela, of a blackiſh brown colour, and with a pale throat : it is about the ſize of the common cat, but more ſlender. See MUSTELA.

MARTIN is alſo the name of a bird of the hirundo kind, of a black colour, and with the throat white.

MARTINGALE, in the manege, a thong of leather faſtened to one end of the girths under the belly of a horſe, and at the other end to the muſsroll, to keep him from rearing.

MARTLETS, in heraldry, little birds repreſented without feet, and uſed as a difference or mark of diſtinction for younger brothers, to put them in mind that they are to truſt to the wings of virtue and merit, in order to raiſe themſelves, and not to their feet, they having little land to ſet their feet on.

MARTYNIA, in botany, a genus of plants, whoſe flower is monopetalous and campanulated, gibbous at the baſe, and containing a honey juice : the fruit is an oblong gibbous capſule, dividing into two parts, including a ligneous wrinkled nut, terminating with two incurved horns, and containing four cells, each including an oblong ſeed.

MARTYR, in the Chriſtian ſenſe of the word, is one who lays down his life for the Goſpel, or ſuffers death for the ſake of his religion.

The feſtivals of the martyrs are of very ancient date in the Chriſtian church, and may be carried back at leaſt till the time of Polycarp, who ſuffered martyrdom about the year of Chriſt 168. On theſe days the Chriſtians met at the graves of the martyrs, and offered prayers and thankſgivings to God for the examples they had afforded them ; they celebrated the euchariſt, and gave alms to the poor ; which, together with a panegyrical oration or ſermon, and reading the acts of the martyrs, were the ſpiritual exerciſes of theſe anniverſaries.

MARTYROLOGY, in the church of Rome, is a catalogue or liſt of martyrs, including the hiſtory of their lives and ſufferings for the ſake of their religion.

MARVEL *of Peru*, in botany. See the article MIRABILIS.

MARUM, Syrian-maſtich, in botany, a low ſhrubby plant, with leaves like thoſe of thyme, but hoary ; the flowers are of the labiated kind, and grow in whorled ſpikes ; they appear in July and Auguſt.

Marum is propagated by ſlips or cuttings in the ſummer months, and afterwards tranſplanted in a warm dry ſituation ; but the greateſt difficulty is to preſerve it from cats, who are ſo fond of it, that they will come a conſiderable diſtance and deſtroy it ; but if there are great quantities of it together, they will but little damage it.

Marum is reputed cephalic, and good in all diſorders of the nerves, and alſo for ſtopping hæmorrhages.

MARY MAGDALEN's DAY, a feſtival of the Romiſh church, obſerved on the twenty-ſecond of July.

MASCULINE, or MASCULINE GENDER, among grammarians, that belonging to the male. See GENDER.

MASON, a perſon employed under the direction of an architect, in the raiſing of a ſtone building.

The chief buſineſs of a maſon is to make the mortar, raiſe the walls from the foundation to the top, with the neceſſary retreats and perpendiculars ; to form the vaults, and employ the ſtones as delivered to him. When the ſtones are large, the buſineſs of hewing or cutting them belongs to the ſtone-cutters, though theſe are frequently confounded with maſons : the ornaments of ſculpture are performed by carvers in ſtone or ſculptors. The tools or implements principally uſed by them are the ſquare, level, plumb-line, bevel, compaſs, hammer, chiſſel, mallet, ſaw, trowel, &c. See the articles SQUARE, &c.

MASONRY, in general, a branch of architecture, conſiſting in the art of hewing or ſquaring ſtones, and cutting them level or perpendicular, for the uſes of building ; but in a more limited ſenſe, maſonry is the art of aſſembling and joining ſtones together with mortar.

Hence ariſes as many different kinds of maſonry, as there are different forms and manners for laying or joining ſtones. Vitruvius mentions ſeveral kinds of maſonry uſed among the ancients, three of hewed ſtones, viz. that in form of a net, that in binding, and that called the Greek maſonry ; and three of unhewed ſtones, viz. that of an equal courſe, that of an unequal courſe, and that filled up in the middle; and the ſeventh was a compoſition of all the reſt, each in their order.

Net-maſonry, called by Vitruvius reticulatum, from its reſemblance to the meſhes of a net, conſiſts of ſtones ſquared in their courſes, and ſo diſpoſed as that their joints go obliquely; and their diagonals are the one perpendicular, and the other level. This is the moſt agreeable maſonry to the eye, but it is very apt to crack. See plate LXIX. *fig.* 8.

Bound-maſonry, that in which the ſtones were placed one over another, like tiles; the joints of their beds being level, and the mounters perpendicular, ſo that the joint that mounts and ſeparates two ſtones, always falls directly over the middle of the ſtone below. This is leſs beautiful than the net-work; but it is more ſolid and durable. See *fig.* 9.

Greek-maſonry, according to Vitruvius, is that where after we have laid two ſtones, each of which makes a courſe, another is laid at the end, which makes two courſes, and the ſame order is obſerved throughout the building; this may be called double binding, in regard the binding is not only of ſtones of the ſame courſe with one another, but likewiſe of one courſe with another courſe. See *fig.* 10.

Maſonry by equal courſes, called by the ancients iſodomum, differs in nothing from the bound-maſonry, but only in this, that its ſtones are not hewn. See *fig.* 11.

Maſonry by unequal courſes, called pſeudiſodomum, is alſo made of unhewed ſtones, and laid in bound-work; but then they are not of the ſame thickneſs, nor is there any equality obſerved, excepting in the ſeveral courſes; the courſes themſelves being unequal to each other. See *fig.* 12.

Maſonry filled up in the middle, called by the ancients emplection, is likewiſe made of unhewed ſtones, and by courſes; but the ſtones are only ſet in order as to the courſes.

Fig. 13. A, the courſes; B, the parts filled up; C, a coat of plaſter.

Compound maſonry is of Vitruvius's propoſing, ſo called as being formed of all the reſt. In this, the courſes are of hewed ſtones; and the middle being left void, is filled up with mortar and pebbles thrown in together: after this, the ſtones of one courſe are bound to thoſe of another courſe, with cramp-irons faſtened with melted lead.

Fig. 14. E, the ſtones cramped; F, the cramps; G, the middle part filled up.

Fig. 15. repreſents another ſort of compound maſonry, the middle of which is ſtone, and the edges boards.

All the kinds of maſonry now in uſe may be reduced to theſe five, viz. bound maſonry; that of brick-work, where the bodies and projectures of the ſtones incloſe ſquare ſpaces or pannels, &c. ſet with bricks; that de moilon, or ſmall work, where the courſes are equal, well ſquared, and their edges or beds ruſticated; that where the courſes are unequal; and that filled up in the middle with little ſtones and mortar.

MASQUE, or Mask, a cover for the face, with ſuitable apertures for the eyes and mouth.

MASQUES, in architecture, denotes certain groteſque faces, uſed to fill vacant places, as friezes, pannels of doors, keys of arches, &c.

MASQUERADE, an aſſembly of perſons maſked, and dreſſed in peculiar habits, meeting to dance and divert themſelves.

MASS, *Miſſa*, in the church of Rome, the office or prayers uſed at the celebration of the euchariſt; or in other words, conſecrating the bread and wine into the body and blood of Chriſt, and offering them ſo tranſubſtantiated, as an expiatory ſacrifice for the quick and the dead. As the maſs is in general believed to be a repreſentation of the paſſion of our bleſſed Saviour, ſo every action of the prieſt, and every particular part of the ſervice, is ſuppoſed to allude to the particular circumſtancee of his paſſion and death.

MASSALIANS, a ſet of enthuſiaſts who ſprang up about the year 361, in the reign of the emperor Conſtantius, who maintained that men have two ſouls, a celeſtial, and a diabolical, and that the latter is driven out by prayer. They pretended to prophecy, and affirmed that they could ſee the Trinity with their corporeal eyes; and believed that the Holy Ghoſt deſcended viſibly upon them, eſpecially at the time of their ordination, when they trod the devil under foot, and danced upon him.

MASSETER, in anatomy, a muſcle which has its origin in the lower and interior part of the jugum, and its end at the external ſuperficies of the angle of the jaw. The ductus Stenonianus, or ſalival duct of Steno, paſſes over this muſcle.

MASSIVE, among builders, an epithet given to whatever is too heavy and ſolid: thus a maſſive column is one too ſhort and thick for the order whoſe capital it bears; and a maſſive wall is one whoſe openings or lights are too ſmall in proportion.

MASSORA, in matters of literature, a critical work, containing remarks on the verſes, words, letters, and vowel-points of the Hebrew text of the Bible; a work more laborious than uſeful, ſuch poor obſervations being beneath the notice of men of learning.

MAST, in ſhip building, a large ſtrong poſt, or pole, of timber, ſtanding erect in a ſhip to carry ſail, whereby ſhe is enabled to make her progreſs through the ſea.

Among the ancient Grecians every ſhip had ſeveral maſts: we are nevertheleſs informed by Ariſtotle, that at firſt there was only one maſt, which being fixed in the middle of the ſhip, the hole into which the foot of it was inſerted, μεσόδμη; in Latin, *modius*; and in Engliſh, the *ſtep*. The parts of the maſt were theſe: πτερνα, or the foot; λινας, or, according to Athenæas, λινος, or τραχηλος, to which the ſail was fixed; καρχησιον, the pulley by which the ropes were turned round; θωρακιον, built in the manner of a turret, for ſoldiers to ſtand upon and caſt their darts; above this was a piece of wood, called ικριον, the extremity of which was termed ηλακατη, on which hung a ribband, called, ftom its continual motion, επισειων, turning round with the wind; this is termed in Engliſh, the *vane*.

With regard to the moderns, the maſts of their ſhips generally conſiſt of three pieces, joined together lengthwiſe, viz. the lower-maſt, the top-maſt, and the top-gallant-maſt. The top-maſt ſtands at the head of the lower-maſt, and the top-gallant-maſt at the head of the top-maſt in the ſame manner, and either of the two latter can be occaſionally taken down; but the lower-maſt as it is ſettled on the keel of the ſhip, can only be removed by hoiſting it out or cutting it away.

A little below the head of the lower-maſt is fixed the frame of the top, which reſts upon the hounds of the maſt; through this frame the top-maſt is hoiſted, after which, the head of it paſſes through the cap, which is a block of wood with two holes in it, one of which reſts on the head of the lower-maſt, and the other ſerves as above to keep the top-maſt ſteady. When the top-maſt is thus hoiſted up to its utmoſt extent, and kept ſteady above by the cap, and below by the top-frame, a large bar of wood or iron is thruſt through a ſquare hole in the heel of it, cut for that purpoſe; and this bar extending acroſs the middle of the top-frame, the whole weight of the top-maſt reſts upon it; as does the top-gallant-maſt in the ſame manner at the head of the top-maſt.

As every maſt is compoſed of three pieces, it will be alſo neceſſary to inform our readers that all ſhips, properly ſo called, are furniſhed with three maſts, viz. the main-maſt, the fore-maſt, and mizen-maſt. Thoſe which have only two or one maſt, are not called ſhips by ſeamen, but vary their names according to their method of rigging. Of two maſts, there are ſnows, brigs, bilanders, ketches, buſſes, ſchooners, and hermaphrodites, among the Engliſh. Among the Spaniards and Italians, ſettees, barco-longas, feluccas, &c. Thoſe of one maſt are ſloops, tartans, bean-cods, ſhallops, &c.

In the Britiſh navy, maſts are proportioned to the extreme breadth of the ſhip from out to out.

Proportion for the length of maſts, Anno 1745.

			Guns.
1000 : breadth in feet : :	748 :	main-maſt in yards	100
	756 :		90
	753 :		80
	741 :		70 & 60
	740 :		50
	747 :		44
	760 :		24

1000 : main-maſt : :	895 : 901 :	fore-maſt	100, 90, 80, & all the reſt.
1000 : main-maſt : :	870 866	mizen-maſt	100, 90, 80, & all the reſt.
1000 : main-maſt : :	640 613	bowſprit	100, 90, 80 & all the reſt.
1000 : main-maſt : :	600 605 613	main-top-maſt	100, 90, 80, 70, 60, 50, 40, 24.
1000 : main-top-maſt : :	900 : 910 :	fore-top-maſt	100, 90, 80, all the reſt.
1000 : main-top-maſt : :	710 717	mizen-top-maſt	100, 90, 80, all the reſt.
1000 : main-top-maſt : :	480 508	main-top-gallant-maſt	100, 90, 80, all the reſt.
1000 : fore-top-maſt : :	480 : 505 :	fore-top-gallant-maſt	100, 90, 80, all the reſt.

The proportion for maſting ſhips in the merchants ſervice, is generally regulated by the judgment and experience of the commander.

The main and fore-maſt in all ſhips down to 60 guns, one inch diameter to every yard in length.

For 50 and 40 guns, twenty-ſeven twenty-eighths of an inch diameter to one yard in length.

For 24 guns, twelve thirteenths of an inch in diameter to one yard in length.

All top-maſts are nine-tenths of an inch in diameter to one yard in length.

The fore-top-maſt as big as the main-top-maſt.

The top-gallant-maſt, one inch to a yard.

The mizen-maſt, fifteen twenty-ſeconds of an inch to one yard in length.

The mizen-top-maſt, five-ſixths of an inch to one yard in length.

The bowſprit, an inch and a half to one yard.

The jib-boom, ſeven-eights of an inch to a yard. See the articles BOWSPRIT and JIB-BOOM.

MASTER, *Magiſter*, in general, is a title of authority; as the grand maſter of Malta, the maſter of St. Lazarus, &c.

MASTER *of a Ship of War*, an officer who has the charge of navigating the ſhip from port to port, under the direction of the captain; the management and diſpoſition of the ſails, the conducting the ſhip in all extremities of danger, and directing her motions in the time of action, more particularly belongs to him; as alſo to ſuperintend the proviſions, and ſee that none are permitted to come aboard but ſuch as are wholeſome and ſweet: he is alſo to take care that they are ſafely ſtowed by his mates and quarter-maſters; theſe are alſo employed to ſuperintend the navigation when he is off the deck, and to aſſiſt wherever his duty is concerned.

MASTER *of a Merchant-Ship*, the officer who commands and directs her courſe, manages her lading, and all other affairs.

MASTER *at Arms*, in the marine, an officer, whoſe buſineſs it is to confine and plant centries over the priſoners in a ſhip of war; to obſerve that all the lights and fire are put out when the evening gun fires, only ſuch as are allowed by proper authority, or which are under the inſpection of centries: he is alſo to attend the ſide when any boats come aboard, and ſearch carefully that no ſpirituous liquors are brought into the ſhip, but what are permitted by the commanding-officer. He is likewiſe to teach the ſea-men the exerciſe of the ſmall arms, to which they generally have a great averſion; for this purpoſe, in large ſhips, the maſter at arms has ſeveral corporals under him to aſſiſt in his office, and relieve the centries and each other. See the article CORPORAL.

MASTER *Attendant*, in the king's dock-yards, an officer whoſe duty it is to obſerve that all the ſhips, which are laid up, or ſaid to be in ordinary, are properly moored, cleaned, and kept in order; for which purpoſe he is often to viſit and examine them; he alſo attends the muſters in the dock-yard, to obſerve that all the men regiſtered on the books do their duty: he has likewiſe the charge of the moorings, which are fixed in the river or harbour where he reſides, and theſe he is always to keep in good repair, that they may be ready to moor the ſhips of war when neceſſary, which employment he muſt alſo ſee ſecurely performed: he removes the ſhips from one place to another in the harbour, and pilots them into and out of the docks, &c. See the articles DOCK-YARD, ORDINARY, and MOORINGS.

MASTER *Shipwright*. See the article SHIPWRIGHT.

MASTER *of Arts* is the firſt degree taken up in foreign univerſities, and for the moſt part in thoſe of Scotland; but the ſecond in Oxford and Cambridge; candidates not being admitted to it till they have ſtudied ſeven years in the univerſity. See the article DEGREE.

MASTERS *in Chancery*, in ordinary, of which there are twelve, the maſter of the rolls being chief, are uſually choſen out of the barriſters of the common law, and ſit in chancery, or at the rolls, as aſſiſtants to the lord chancellor and maſter of the rolls.

MASTER GUNNER. See GUNNER.

MASTER *of the Horſe*, a great officer of the crown, who orders all matters relating to the king's ſtables, races, breed of horſes; and commands the equerries and all the other officers and tradeſmen employed in the king's ſtables. His coaches, horſes, and attendants are the king's, and bear the king's arms and livery.

MASTER *of the Ordnance*, a great officer who has the chief command of the king's ordnance and artillery.

MASTER *of the Revels*, an officer who orders all things relating to the performance of plays, maſks, balls, &c. at court.

MASTER *of the Rolls*, a patent officer for life, who has the cuſtody of the rolls of parliament and patents which paſs the great ſeal, and of the records of chancery, as alſo commiſſions, deeds recognizances, which being made of rolls of parchment, gave riſe to the name.

MASTERWORT, in botany. See the article IMPERATORIA.

MASTICH, in the materia medica, a concrete reſin, obtained in the iſland Chio from the Lentiſk tree, brought over in ſmall yellowiſh tranſparent grains or tears. From tranſverſe inciſions made in the bark of the tree, about the beginning of Auguſt, the reſin exudes in drops, which running down and concreting on the ground, are thence ſwept up. The tree is raiſed alſo in ſeveral parts of Europe; but no reſin has been obſerved to iſſue from it in theſe climates; nor do all the trees of this ſpecies in the iſland Chio itſelf, afford this commodity. See the article LENTISCUS.

This reſin has a light agreeable ſmell, eſpecially when rubbed or heated: in chewing, it firſt crumbles, ſoon after ſticks together, and becomes ſoft and white like wax, without impreſſing any conſiderable taſte.

Maſtich is recommended, in doſes from half a ſcruple to half a dram, as a mild corroborant and reſtringent, in old coughs, hemoptyſes, diarrœas, weakneſs of the ſtomach, &c. It is given either in ſubſtance, divided by other materials; or diſſolved in ſpirit, and mixed with ſyrups; or diſſolved in water into an emulſion by the intervention of gum-arabic or almonds: the decoctions of it in water, which ſome have directed, have little or nothing of the virtue of the maſtich.

MASTICATION, *Maſticatio*, in medicine, the action of chewing, or of agitating the ſolid parts of our food between the teeth, by means of the motion of the jaws, the tongue, and the lips, whereby it is broken into ſmall pieces, impregnated with ſaliva, and ſo fitted for deglutation, and a more eaſy digeſtion.

MASTICATORIES, in medicine, ſuch remedies as are taken in at the mouth; and chewed in order to promote the evacuation of the ſalival humour, as tobacco, ginger, pepper, ſage, roſemary, thyme, maſtich, &c.

MASTIGADOUR, MASTICADOUR, or SLABBERING BIT, in the manege, a ſnaffle of iron, all ſmooth, and of a piece, guarded with paternoſters, and compoſed of the halfs of great rings, made into demi-ovals, of unequal bigneſs; the leſſer being incloſed within the greater, which ought to be about half a foot high. See the article BIT.

MASTOIDES, in anatomy, the ſame with mammillaris; being applied to ſuch proceſſes in the body as have the appearance of breaſts or dugs, ariſing in a broad baſis, and terminating in an obtuſe top. Maſtoides is ſometimes applied to the muſcle which ſtoops the head, proceeding from the neck-bone and breaſt-bone, and terminating in the proceſs of the mammiformis.

MAT, among ſailors, a ſort of web or texture, formed of a variety of foxes, each of which conſiſts of a certain number of rope yarns twiſted together; the foxes are conſequently larger or ſmaller, in proportion to the ſize of the mat required.

Mats are uſed to faſten on the outſides of the ſhrouds, and backſtays, to prevent them from being chafed or fretted by the motion of other ropes which bear againſt them; alſo to laſh on ſeveral block-ſtrops, &c. for the ſame purpoſe; the largeſt ſort of them are called panches. See the article Panch.

MATCH, a kind of rope ſlighly twiſted, and prepared to retain fire for the uſes of the artillery, mines, fireworks, &c.

It is made of hempen tow, ſpun on the wheel like cord, but very ſlack; and is compoſed of three twiſts, which are afterwards again covered with tow, ſo that the twiſts do not appear: laſtly, it is boiled in the lees of old wines. This, when once lighted at the end, burns on gradually and regularly, without ever going out, till the whole be conſumed: the hardeſt and drieſt match is generally the beſt.

MATCHING, in the wine-trade, the preparing veſſels to preſerve wines and other liquors, without their growing ſour or vapid. The method of doing it, as directed by Dr. Shaw, is as follows: melt brimſtone in an iron ladle, and when thoroughly melted, dip into it ſlips of coarſe linen cloth; take theſe out, and let them cool: this the wine-coopers call a match; take one of theſe matches, ſet one end of it on fire, and put it into the bung-hole of a caſk; ſtop it looſely, and thus ſuffer the match to burn nearly out: then drive in the bung tight, and ſet the caſk aſide for an hour or two. At the end of this time examine the caſk, and you will find that the ſulphur has communicated a violent pungent and ſuffocating ſcent to the caſk, with a conſiderable degree of acidity, which is the gas and acid ſpirit of ſulphur. The caſk may after this be filled with a ſmall wine, which has ſcarce done its fermentation, and bunging it down tight, it will be kept good and will ſoon clarify: this is a common and very uſeful method, for many poor wines could ſcarce be kept potable even a few months without it.

MATE *of a Ship of War*, an officer under the maſter, whoſe duty it is to obſerve the navigation of the ſhip, and to keep the log ſtrictly marked; to trim the ſails in the fore-part of the ſhip, and to ſuperintend all affairs relating to the cables, moorings, and riding of the ſhip; to command the boats in which proviſions and water are brought to the ſhip, and aſſiſt in ſtowing them after they arrive aboard. See the articles Log, Master, and Trim.

Mate *of a Merchant Ship*, the officer who commands the ſhip in abſence of the commander, and ſhares the duty with him.

The number of mates both in ſhips of war and merchantmen, is in proportion to the ſize of a ſhip: a firſt rate man of war has ſix mates, and an Eaſt-India-man the ſame number.

MATERIA Subtilis, denotes a fine ſubtile matter which the Carteſians ſuppoſe to pervade and penetrate freely the pores of all bodies, to fill up all their pores ſo as not to leave the leaſt vacuity or interſtice between them; they had recourſe to this machine to ſupport the doctrine of an abſolute plenum, and to make it conſiſtent with the phænomenon of motion, &c. See the article Cartesian Philosophy.

Materia Chemica, a term uſed by authors to expreſs ſuch bodies as are the peculiar objects of chemical experiments.

Materia Medica comprehends all the ſubſtances either uſed in medicine in their natural ſtate, or which afford preparations that are ſo; theſe belong partly to the animal, partly to the vegetable, and partly to the foſſile kingdom.

MATHEMATICS, that ſcience which conſiders magnitudes either as they are computable or meaſurable; that part which relates to number only, is called arithmetic; and that which relates to meaſure in general, whether length, breadth, depth, motion, force, &c. is called geometry.

The word is Greek, μαθηματικη, ſignifying the ſame thing, which is derived from μαθητης, a diſciple, and that from μανθανω, to teach.

The firſt who cultivated mathematics after the flood were the Aſſyrians and Chaldeans, from whom, ſays Joſephus, they were carried by Abraham to the Egyptians, and among theſe Ariſtotle fixes the firſt riſe of mathematics. From Egypt, 584 years before Chriſt, they paſſed into Greece through the hands of Thales; after him came Pythagoras, who paid a particular regard to arithmetic, fetching the greateſt part of his philoſophy from numbers; he firſt, according to Laertius, abſtracted geometry from matter; and to him we owe the doctrine of incommenſurable magnitude, the five regular bodies, beſides the principles of muſic and aſtronomy. To him ſucceeded Anaxagoras, Oenopides, Briſo, Antipho, and Hippocrates, of Scio, who all applied to the quadrature of the circle, duplicature of the cube, but the laſt with moſt ſucceſs, and Proclus mentions him as the firſt compiler of mathematical elements.

Democritus excelled in mathematics as well as phyſics. The next is Plato, who not only improved geometry, but introduced it into phyſics. Out of his ſchool proceeded a croud of mathematicians,

ticians, among whom was Leodamus, who improved the analyſis firſt invented by Plato; Theæretus, who wrote on elements, and Archytas, who firſt applied mathematics to uſe in life. Theſe were ſucceeded by Neocles and Theon. Eudoxus excelled in arithmetic and geometry, and was the firſt founder of a ſyſtem of aſtronomy. Menechonus improved the elements.

Ariſtotle's works are ſtored with mathematics; out of whoſe ſchool came Eudemus and Theophraſtus; the firſt wrote of numbers, geometry, and inviſible lines; the later a mathematical hiſtory. To Ariſteus, Iſidorus, and Hypſicles, we owe the book of ſolids, which, with the other books of elements, were improved and methodiſed by Euclid, who died 284 years before Chriſt.

An hundred years after Euclid, came Eratoſthenes and Archimedes; cotemporary with the latter was Conon. Soon after came Apollonius Pergæus, whoſe conics are ſtill extant. Hipparchus and Menelaus wrote on the ſubtenſes in a circle, the latter on ſpherical triangles. Theodoſius's three books of ſpherics are ſtill extant.

In the year 70, Ptolomy of Alexandria was born; he was ſucceeded by Plutarch the philoſopher; after him was Eutocius, who commented on Archimedes, and occaſionally mentions ſeveral inventions on the duplicature of the cube. To Cteſebes of Alexandria we owe our pumps; and Geminus came ſoon after, whom Proclus prefers to Euclid himſelf.

Diophantus of Alexandria was a great maſter of numbers, and firſt inventor of algebra. Nicomachus is celebrated for his arithmetical, geometrical, and muſical works; Serenus, for his books on the ſection of the cylinder; Proclus, for his comments on Euclid: and Theon is, by ſome, thought to be the author of Euclid's Elements. Pappus of Alexandria flouriſhed in the year 400, and his books of Mathematical Collections are ſtill extant.

Dr. Barrow gives a moſt elegant deſcription of the excellence and uſefulneſs of mathematical knowledge, in his Inaugural Oration, upon being appointed profeſſor of mathematics at Cambridge.

The mathematics, he obſerves, effectually exerciſe, not vainly delude, nor vexatiouſly torment ſtudious minds with obſcure ſubtilties; but plainly demonſtrate every thing within their reach, draw certain concluſions, inſtruct by profitable rules, and unfold pleaſant queſtions. Theſe diſciplines likewiſe enure and corroborate the mind to a conſtant diligence in ſtudy; they wholly deliver us from a credulous ſimplicity, moſt ſtrongly fortify us againſt the variety of ſcepticiſm, effectually reſtrain us from a raſh preſumption, moſt eaſily incline us to a due aſſent, perfectly ſubject us to the government of right reaſon. While the mind is abſtracted and elevated from ſenſible matter, diſtinctly views pure forms, conceives the beauty of ideas, and inveſtigates the harmony of proportions; the manners themſelves are ſenſibly corrected and improved, the affections compoſed and rectified, the fancy calmed and ſettled, and the underſtanding raiſed and excited to more divine contemplations.

Mathematics are commonly diſtinguiſhed into pure and ſpeculative, which conſider quantity abſtractedly; and mixed, which treat of magnitude as ſubſiſting in material bodies, and conſequently are interwoven every where with phyſical conſiderations.

Mixed mathematics are very comprehenſive; ſince to them may be referred aſtronomy, optics, geography, hydrography, hydroſtatics, mechanics, fortification, navigation, &c. See the articles ASTRONOMY, OPTICS, &c.

Pure mathematics have one peculiar advantage, that they occaſion no diſputes among wrangling diſputants, as in other branches of knowledge; and the reaſon is, becauſe the definitions of the terms are premiſed, and every body that reads a propoſition has the ſame idea of every part of it. Hence, it is eaſy to put an end to all mathematical controverſies, by ſhewing either that our adverſary has not ſtuck to his definitions, or has not laid down true premiſes, or elſe, that he has drawn falſe concluſions from true principles, and in caſe we are able to do neither of theſe, we muſt acknowledge the truth of what he has proved.

MATRICARIA, feverfew, in botany. See FEVERFEW.

MATRICULA, a regiſter kept of the admiſſion of officers and perſons entered into any body or ſociety, of which a liſt is made.

MATRIX, *Uterus*, the womb, in anatomy, that part of the female of any kind, where the fœtus is conceived and nouriſhed till the time of its delivery. See UTERUS.

MATRIX alſo denotes a place proper for the generation of vegetables, minerals, metals.

MATRIX, in letter-foundery. See the article FOUNDERY.

MATRONALIA, a feſtival of the ancient Roman matrons, from whom it had its name. It was celebrated on the calends of March, in honour of the god Mars; and was to the Roman ladies what the feſtival of the Saturnalia was to their huſbands; for at this time they ſerved their women-ſlaves at table, and received preſents from their huſbands.

MATROSSES are ſoldiers in the train of artillery, who are next to the gunners, and aſſiſt them in loading, firing, and ſpunging the great guns. They carry firelocks, and march along with the ſtore waggons, both as a guard, and to give their aſſiſtance in caſe a waggon ſhould break down.

MATTER, *Materia*, in phyſiology, whatever is extended and capable of making reſiſtance: hence, becauſe all bodies, whether ſolid or fluid, are extended and do reſiſt, we conclude that they are materal, or made up of matter. The Carteſians, it is true, make matter to conſiſt in extenſion alone; but extenſion without reſiſtance, is nothing but mere ſpace. That matter is one and the ſame thing in all bodies, and that all the variety we obſerve ariſes from the various forms and ſhapes it puts on, ſeems ſeems very probable, and may be concluded from a general obſervation of the procedure of nature in the general formation and deſtruction of bodies. Thus, for inſtance, water, rarefied by heat, becomes vapour; great collections of vapours form clouds; theſe condenſed deſcend in the form of hail or rain; part of this collected on the earth conſtitutes rivers, another part mixing with the earth enters into the roots of plants, and ſupplies matter to, and expands itſelf into various ſpecies of vegetables. In each vegetable it apears in one ſhape in the root, another in the ſtalk, another in the flowers, another in the ſeeds, &c. From hence various bodies proceed; from the oak, houſes, ſhips, &c. from hemp and flax we have thread; from thence our various kinds of linen; from thence garments; theſe degenerate into rags, which receive from the mill the various forms of paper; hence our books; which by fire are converted partly into water, partly into oil, another part into air, a fourth part into ſalt, and a fifth into earth; which are called the elements of bodies; and which, mixed with common earth, are again reſuſcitated in various forms of bodies.

Sir Iſaac Newton thinks it highly probable, that God in the beginning formed matter into ſolid, maſſy, impenetrable, moveable particles, or atoms, of ſuch ſizes and figures, and with ſuch other properties, and in ſuch proportion to ſpace, as moſt conduced to the end for which he formed them; and that theſe primitive particles being ſolids, are incomparably harder than any porous bodies compounded of them, even ſo hard as never to wear or break in pieces; no ordinary power being able to divide what God himſelf made one in the firſt creation. While theſe particles continue entire, they may compoſe bodies of one and the ſame nature and texture in all ages; but ſhould they wear away, or break in pieces, the nature of things depending on them may be changed. Water and earth, compoſed of old worn particles and fragments of particles, would not be of the ſame nature and texture now, with water and earth compoſed of intire particles in the beginning; and therefore, that nature may be laſting, the changes of corporeal things are to be placed only in the various ſeparations and new aſſociations of motions of theſe permanent particles, compound bodies being apt to break, not in the midſt of ſolid particles, but where theſe particles are laid together, and only touch in a few points. See the article Atom.

Matter *in Deed*, in law, ſignifies a particular matter of fact to be proved by ſome deed, and is frequently mentioned with matter of record; as where a man, during his abſence abroad in the king's ſervice, is ſued to an exigent; in which caſe, if ſuch perſon would take advantage of this matter in deed, he muſt alledge it before a ſcire facias for execution is awarded againſt him, otherwiſe he can have no relief but from matter of record; that is, ſome error in the proceedings appearing upon the face of the record.

MATTHEW, or *Goſpel of St.* Matthew, a canonical book of the New-Teſtament.

St. Matthew wrote his Goſpel in Judea, at the requeſt of thoſe he had converted, and it is thought he began it in the year 41, eight years after Chriſt's reſurrection. It was written, according to the teſtimony of all the ancients, in the Hebrew or Syriac language, which was then common in Judea; but the Greek verſion of it, which now paſſes for the original, is as old as the apoſtolical times. St. Matthew's view in writing his Goſpel, was chiefly to ſhew the royal deſcent of Jeſus Chriſt, and to repreſent his life and converſation among men. No one of the Apoſtles enters ſo far into the particulars of the actions of Jeſus Chriſt, or has given ſo many rules for the conduct of life. If we compare him with the other three evangeliſts, we may obſerve a remarkable difference in the order and ſucceſſion of our Saviour's actions, from chap. iv. to chap. xiv. 13. Some have imputed this variation of St. Matthew to mere chance; and others, to choice and deſign: however, it can be no prejudice to the truth of the facts, which are the eſſential part of the Goſpel; and as to the order of time, the ſacred authors were not always ſolicitous about it.

St. Matthew *the Evangeliſt's Day*, a feſtival of the Chriſtian church, obſerved on September the twenty-firſt.

St. MATTHIAS'*s Day*, a feſtival of the Chriſtian church, obſerved on the twenty-fourth of February.

MATTINS, the firſt canonical hour, or the firſt part of the daily ſervice in the Romiſh church.

MATURATION, in ſurgery, the ſame with ſuppuration. See Suppuration.

MAUNCH, in heraldry, the figure of an ancient coat ſleeve, borne in many gentlemen's eſcutcheons.

MAUNDY-Thursday, is the Thurſday in Paſſion-week, which was called Maunday or Mandate Thurſday, from the command which our Saviour gave his Apoſtles to commemorate him in the Lord's Supper, which he this day inſtituted; or from the new commandment which he gave them to love another, after he had waſhed their feet as a token of his love to them.

Our Saviour's humility in waſhing his diſciples feet, is commemorated on this day by moſt Chriſtian kings, who waſh the feet of a certain number of poor people, not indeed with their own royal hands.

hands, but by the hands of their lord almoner, or ſome other deputy.

MAUROCENIA, in botany, a genus of plants, whoſe flower conſiſts of five oval petals, which ſpread open; it hath five ſubulated filaments, topped with obtuſe antheræ: the fruit is an oval berry with one or two cells, each containing a ſingle oval ſeed.

MAUSOLEUM, a magnificent tomb, or funeral monument. The word is derived from Mauſolus, king of Caria, to whom Artimiſia, his widow, erected a moſt ſtately monument, eſteemed one of the wonders of the world, and called it, from his name Mauſoleum.

MAXILLA, the jaws, or thoſe parts of an animal in which the teeth are ſet.

The jaws are ſhorter in the human frame than in that of any other animal, in proportion to the ſize of the body; and this is a circumſtance that adds greatly to the beauty of the face. The upper jaw is compoſed of thirteen bones, twelve of which are in pairs: theſe are, 1, the lachrymal; 2, the naſal; 3, the jugal; 4, the maxillar; 5, the ſpongioſum inferius; 6, the palatine; the thirteenth is an odd bone, and is called the vomer. Theſe ſeveral bones of the upper maxilla are united to one another by a kind of juncture, which appears equal and even, and is called by anatomiſts *junctura per harmonium.*

The maxilla inferior, or lower jaw, is that moveable bone of the head which contains the lower ſeries of teeth; this is compoſed of two bones which unite in the middle of the chin, by the intervention of a cartillage, which hardens as the child grows, and at length becoming bony, joins the two bones into a continued one, reſembling the Greek *υ*. It conſiſts of two tables, between which there is a ſpongy ſubſtance, which in children is medullary. The fore-part is ſhallow, and juſt ſufficient to contain the ſockets of ſixteen teeth. It has two proceſſes, the coronoide and condyloides; four foramina or holes for the paſſage of blood-veſſels and nerves, and ſix pair of muſcles, of which two are depreſſors and four elevators; the depreſſors are called the platyſma myoides, and the biventer; and the four pair of elevators are, the crotaphites, the maſſeters, and the internal and external pterygoidæi, which ſee, under their ſeveral names. There is alſo the maxillary gland, ſituated on the inſide under the lower jaw-bone. See the article GLAND.

MAXIMUM, in mathematics, denotes the greateſt quantity attainable in any given caſe.

If a quantity conceived to be generated by motion, increaſes, or decreaſes, till it arrives at a certain magnitude or poſition, and then, on the contrary, grows leſſer or greater, and it be required to determine the ſaid magnitude or poſition, the queſtion is called a problem de maximis et minimis.

The rule therefore to determine any flowing quantity in any equation propoſed, to an extreme value, is, having put the equation into fluxions, let the fluxion of that quantity (whoſe extreme value is ſought) be ſuppoſed equal to nothing: by which means all thoſe members of the equation in which it is found, will vaniſh, and the remaining ones will give the determination of the maximum or minimum required.

Problem I. To divide a given right line into two ſuch parts, that their product, or rectangle, may be the greateſt poſſible. This is the caſe, when the line is biſſected, or divided into equal parts.

In any mechanical engine, the proportion of the power to the weight, when they ballance each other, is found by ſuppoſing the engine to move, and reducing their velocities to the reſpective directions in which they act; for the inverſe ratio of theſe velocities is that of the power to the weight, according to the general principle of mechanics. But it is of uſe to determine likewiſe the proportion they ought to bear to each other, that when the power prevails, and the engine is in motion, it may produce the greateſt effect in a given time. When the power prevails, the weight moves at firſt with an accelerated motion; and when the velocity of the power is invariable, its action upon the weight decreaſes, while the velocity of the weight increaſes. Thus the action of a ſtream of water or air upon a wheel, is to be eſtimated from the exceſs of the velocity of the fluid above the velocity of the part of the engine which it ſtrikes, or from their relative velocity only. The motion of the engine ceaſes to be accelerated when this relative velocity is ſo far diminiſhed, that the action of the power becomes equal to the reſiſtance of the engine ariſing from the gravity of the matter that is elevated by it, and from friction; for when theſe ballance each other, the engine proceeds with the uniform motion it has acquired.

Prob. II. Let a denote the velocity of the ſtream, u the velocity of the part of the engine which it ſtrikes when the motion of the machine is uniform, and $a-u$ will repreſent their relative velocity. Let A repreſent the weight which would ballance the force of the ſtream when its velocity is a, and p the weight which would ballance the force of the ſame ſtream if its velocity was only $a-u$; then $p : A :: \overline{a-u}^2 : a^2$, or $p = A \times \frac{\overline{a-u}^2}{aa}$ and p ſhall repreſent the action of the ſtream upon the wheel. If we abſtract from friction, and have regard to the quantity of the weight only, let it be equal to $q\,A$ (or be to A as q to 1) and becauſe the motion of the machine is ſuppoſed uniform, $p = q \times A = \frac{A \times \overline{a-n}^2}{aa}$, or $q = \frac{\overline{a-u}^2}{aa}$. The momentum of this weight is $q\,A\,u =$

$A\,u \times a$

$\frac{Au\times\overline{a-u}^{2}}{aa}$; which is a maximum when the fluxion of $\frac{a\times\overline{a-u}^{2}}{aa}$ vaniſhes, that is, when $u\times\overline{a-u}^{2}-2uu\times a-u=o$, or $a-3u=o$. Therefore, in this caſe, the machine will have the greateſt effect if $u=\frac{a}{3}$, or the weight $q\,A=\frac{A\times\overline{a-u}^{2}}{aa}=\frac{4A}{9}$. That is, if the weight that is raiſed by the engine be leſs than the weight which would ballance the power in the proportion of 4 to 9; and the momentum of the weight is $\frac{4Aa}{27}$.

Prob. III. Suppoſe that the given weight P (plate LXVI. *fig.* 6.) deſcending by its gravity in the vertical line, raiſes a given weight, W, by the cord PMW, (that paſſes over the pulley M) along the inclined plane BD, the height of which, BA, is given; and let the poſition of the plane BD be required, along which W will be raiſed in the leaſt time from the horizontal line AD to B.

Let $AB=a$, $BD=x$, $t=$ time in which W deſcribes BD; then the force which accelerates the motion of W is $P-\frac{aW}{x}$, tt is as $\frac{xx}{Px-aW}$, and if we ſuppoſe the fluxion of this quantity to vaniſh, we ſhall find $x=\frac{2aW}{P}$, or $P=\frac{2aW}{x}$; conſequently the plane BD required is that upon which a weight equal to 2W would be ſuſtained by P; or if BC be the plane upon which W would ſuſtain P, then $BD=2BC$. But if the poſition of the plane BD be given, and W being ſuppoſed variable, it be required to find the ratio of W to P, when the greateſt momentum is produced in W along the given plane BD; in this caſe W ought to be to P as BD to $BA+\sqrt{\overline{BD}+\overline{BA}}+\sqrt{BA}$.

Queſtions of this kind may be likewiſe demonſtrated from the common elementary geometry, of which the following may ſerve as an example:

Problem IV. Let a fluid, moving with the velocity and direction AC (*fig.* 7.) ſtrike the plane CE, and ſuppoſe that this plane moves parallel to itſelf in the direction CB, perpendicular to CA, or that it cannot move in any other direction; then let it be required to find the moſt advantageous poſition of the plane CE, that it may receive the greateſt impulſe from the action of the fluid. Let AP be perpendicular to CE in P, draw AK parallel to CB, and let PK be perpendicular upon it in K; and AK will meaſure the force with which any particle of the fluid impels the plane EC, in the direction CB. For the force of any ſuch particle being repreſented by AC, let this force be reſolved into AQ parallel to EC, and AP perpendicular to it; and it is manifeſt, that the latter AP only has any effect upon the plane CE. Let this force AP be reſolved into the force AL, perpendicular to CB, and the force AK parallel to it; then it is manifeſt, that the former, AL, has no effect in promoting the motion of the plane CE, in the direction CB. Let EM and EN be perpendicular to CA and CB, in M and N; and the number of particles, moving with directions parallel to AC, incident upon the plane CE, will be as EM. Therefore the effort of the fluid upon CE, being as the force of each particle, and the number of particles together, it will be as $AK\times EM$; or, becauſe AK is to AP ($=EM$) as EN to CE, as $\frac{EM^{2}EM\times EN}{CE}$; ſo that CE being given, the problem is reduced to this, to find when $EM^{2}\times EN$ is the greateſt poſſible, or a maximum. But becauſe the ſum of EM^{2} and of EN^{2} ($=CM^{2}$) is given, being always equal to CE^{2}, it follows that $EN^{2}\times EM^{4}$ is greateſt when $EN^{2}=\frac{1}{3}CE^{2}$; for when the ſum of two quantities AC and CB (*fig.* 8.) was given, $AC\times CB^{2}$ is greateſt when $AC=\frac{1}{3}AB$, as will be very evident if a ſemicircle is deſcribed upon AD. But when $EN^{2}\times EM^{4}$ is greateſt, its ſquare root $EN\times EM^{2}$ is of neceſſity at the ſame time greateſt. Therefore the action of the fluid upon the plane CE in the direction CB is greateſt when $EN^{2}=\frac{1}{3}CE^{2}$, and conſequently $EM^{2}=\frac{2}{3}CE^{2}$; that is, when EM, the ſine of the angle ACE, in which the ſtream ſtrikes the plane, is to the radius, as $\sqrt{2}$ to $\sqrt{3}$; in which caſe it eaſily appears from the trigonometrical tables, that this angle is of 54° 44′.

Several uſeful problems in mechanics may be reſolved by what we have juſt now ſhewn. If we repreſent the velocity of the wind by AC (*fig.* 7.) a ſection of the ſail of a windmill perpendicular to its length, by CE, as it follows from the nature of the engine, that its axis ought to be turned directly to the wind, and the ſail can only move in a direction perpendicular to the axis, it appears, that, when the motion begins, the wind will have the greateſt effect to produce this motion, when the angle ACE in which the wind ſtrikes the ſail is of 54° 44′. In the ſame manner, if CB repreſent the direction of the motion of a ſhip, or the poſition of her keel, abſtracting from her lee-way, and AC be the direction of the wind, perpendicular to her way, then the moſt advantageous poſition of the ſail CE, to promote her motion in the direction CB, is when the angle ACE, in which the wind ſtrikes the ſail, is of 54° 44′. The beſt poſition of the rudder, where it may have the greateſt effect in turning round the ſhip, is determined in like manner.

MAY, *Maius*, the fifth month of the year, conſiſting of thirty-one days. See the articles MONTH and YEAR.

MAYOR, the chief magiſtrate of a city or town, choſen annually out of the aldermen.

MEAD, a liquor made of honey, and held in great eſtimation by moſt of the northern nations, but perhaps not eſteemed here ſo much as it might deſerve, if due care was taken to prepare it properly.

All the writers who have hitherto treated of this ſubject, have given into a capital error with regard to the ſtrength of this liquor, by directing too great a proportion of honey to be diſſolved in the water. The uſual practice of making it ſo ſtrong as to bear an egg, is very wrong. The liquor is thereby rendered a mere ſtum, and this bad quality is ſtill increaſed by the long boiling generally practiſed. It ſcarcely poſſible to procure honey ſo pure, but that ſome bee bread, wax, or other ſubſtance is mixed with it, and this cannot be perfectly ſeparated from it, but by boiling. On this account the boiling of mead ſeems indiſputably neceſſary. In order the more effectually to ſeparate theſe impurities from the liquor, it will be adviſeable to mix ſome whites of eggs with it before it is put on the fire, and it will be particularly neceſſary to ſkim off the thick ſcum that riſes, the moment the liquor begins to boil; and this muſt be attentively continued ſo long as it boils. The only method of boiling being here to ſeparate the impurities, and to make a perfect union of the water and the honey, both which purpoſes are very ſoon obtained, it evidently appears that the boiling need be of but very ſhort duration. This becomes here more peculiarly neceſſary, becauſe the liquor will be the leſs diſpoſed to ferment kindly, the longer the boiling has been continued. It is perhaps owing to the ſingle article of long boiling, that mead has hitherto lain under ſo great diſcredit; becauſe it then never fermented ſufficiently to take off its luſcious ſweetneſs; whereas had it undergone a due fermentation, that ſweetneſs would have gone off, and the mead would have attained a fine racy flavour.

Some notable houſewifes have added hops to their mead. This helps to take off its ſweetneſs, and, as the bitterneſs of the hop goes off, gives it a pleaſant flavour. A ferment is here, as in all liquors that are boiled, generally wanted to bring on a perfect fermentation: but as the leaſt taint in the ferment is communicated to the whole liquor, particular care ſhould be taken that it be very ſweet and good. Mead, judiciouſly managed on theſe principles, will keep for years, and be improved by age.

MEADIA, in botany, the ſame with the dodecatheon of Linnæus. See DODECATHEON.

MEADOW, in its general ſignification, means paſture, or graſs land, annually mowed for hay; but is more particularly applied to lands that are ſo low as to be too moiſt for cattle to graze upon them in the winter, without ſpoiling the ſward.

Too much or too little water is almoſt equally prejudicial to meadows, but the beſt land for meadows is a rich ſoil, that has a moiſt bottom, eſpecially where a ſmall brook may be brought over it, and where there is ſuch a deſcent that the water will not lodge: theſe are better than thoſe by great rivers, where the crops are often loſt.

Thoſe that may be overflowed at pleaſure, are called water-meadows; theſe ſhould never be overflowed till the end of March, except once or twice in winter, when there are ſuch floods as bring down a great deal of ſoil from the upper-lands, and if the ſeaſon ſhould prove dry, it will be of great ſervice to the graſs, if the meadows are overflowed again; but then the cattle ſhould not be turned in till the ſward is dry enough to bear their weight. Miller recommends the weeding of meadows in April and October, with a ſpaddle, and rolling them with a heavy roller in ſpring and autumn. See PASTURE.

MEAN, in general, denotes the middle between two extremes: thus we ſay, mean diſtance, mean proportion, &c.

MEASLES, in medicine, a cutaneous diſeaſe, attended with a fever, in which there is an appearance of eruptions that do not tend to ſuppuration.

The meaſles are in general not dangerous, unleſs from an inſalubrious epidemical conſtitution of the year, which ſometimes renders them malignant: which may be known by a ſudden loſs of ſtrength, coldneſs of the extreme parts, great reſtleſſneſs, and a delirium. Thoſe who die of the meaſles are generally ſuffocated on the ninth day. Some have a looſeneſs, which continues ſeveral weeks, and brings on a mortal tabes. Some have a ſlow fever, with an atrophy and a ſwelling of the abdomen, which are fatal; and when a cough and hoarſeneſs remain after the diſeaſe, a conſumption will follow without ſpeedy aſſiſtance.

If children are ſuſpected to abound with crudities in the inteſtines, it will be proper to evacuate with half a grain of tartar emetic, and ſyrup of ſuccory with rhubarb. When there are worms, anthelmintics ſhould be given. In adults abounding with blood, phlebotomy is neceſſary on the firſt days; and as ſoon as the eruption is ended a gentle cathartic is proper: in a cough, nothing is better than oil of almonds freſh drawn, mixt with ſyrup of capillaire; half a ſpoonful of which ſhould be often given in water-gruel. The patient ſhould keep his bed for two days after the firſt eruption, and take abſorbent and diaphoretic powders, to which half a grain of ſaffron may be added; theſe ſhould be taken every night from the firſt onſet of the diſeaſe, till the patient recovers, encreaſing or diminiſhing the doſe according to his age. If after the meaſles diſappear, they ſhould be followed by a difficulty of breathing, a fever, and other ſymptoms of an inflammation of the lungs, let blood be taken freely from the arm, once, twice, or three times, as occaſion ſhall require, leaving a due ſpace between each bleeding, and give oil of ſweet almonds, and about twelve days from the invaſion let the patient be purged. The diet ought to be the ſame as in the ſmall-pox, taking particular care that the body be kept lax rather than bound up, through the courſe of the diſtemper. See Pox.

MEASURE, *Menſura*, in geometry, denotes any quantity aſſumed as one, or unity, to which the ratio of other homogeneous or ſimilar quantities is expreſſed. This definition is ſomewhat more agreeable to practice than that of Euclid, who defines meaſure, a quantity which being repeated any number of times, becomes equal to another. This latter definition anſwers only to the idea of an arithmetical meaſure, or quota-part.

MEASURE *of an Angle*, is an arch deſcribed from the vertex in any place between its legs.

Hence angles are diſtinguiſhed by the ratio of the arches, deſcribed from the vertex between the legs to the peripheries. Angles then are diſtinguiſhed by thoſe arches; and the arches are diſtinguiſhed by their ratio to the periphery: thus an angle is ſaid to be ſo many degrees as there are in the ſaid arch. See the article ANGLE.

MEASURE *of a Figure*, or plane ſurface, is a ſquare whoſe ſide is one inch, foot, yard, or ſome other determinate length. Among geometricians, it is uſually a rod called a ſquare rod, divided into ten ſquare feet, and the ſquare feet into ten ſquare digits.

MEASURE *of a Line*, any right line taken at pleaſure, and conſidered as unity. The modern geometricians uſe a decempeda, or perch divided into ten equal parts, called feet; the feet they ſubdivide into ten digits, and the digit into ten lines, &c.

MEASURE *of the Maſs, or Quantity of Matter*, in mechanics, is its weight; it being apparent that all the matter which coheres and moves with a body, gravitates with it, and it being found by experiment, that the gravities of homogeneal bodies are in proportion to their bulks; hence, while the maſs continues the ſame, the weight will be the ſame, whatever figure it put on: by which is meant its abſolute weight, for as to its ſpecific, that varies as the quantity of the ſurface varies. See the article GRAVITY and MOMENT.

MEASURE *of a Number*, in arithmetic, ſuch a number as divides another without leaving any fraction: thus 9 is a meaſure of 27.

MEASURE *of a Solid*, is a cube whoſe ſide is one inch, foot, yard, or any other determinate length. In geometry, it is a cubic perch, divided into cubic feet, digits, &c. hence cubic meaſures, or meaſures of capacity. See the articles SPHERE, CUBE, &c.

MEASURE *of Velocity*, in mechanics, the ſpace paſſed over by a moving body in a given time. To meaſure a velocity therefore, the ſpace muſt be divided into as many equal parts as the time is conceived to be divided into; the quantity of ſpace anſwering to ſuch an article of time is the meaſure of the velocity. See the article VELOCITY.

MEASURE, in a legal and commercial ſenſe, denotes a certain quantity or proportion of any thing bought, ſold, valued, or the like. Meaſures are then various, according to the various kinds and dimenſions of the things meaſured. Hence ariſe lineal or longitudinal meaſures, for lines or lengths; ſquare meaſures, for areas or ſuper ficies; and ſolid or cubic meaſures, for bodies and their capacities. All which again are very diſferent in different countries, and in different ages, and even many of them for different commodities. Whence ariſe other diviſions of ancient and modern meaſures, domeſtic and foreign ones, dry meaſures, liquid meaſures, &c.

Long MEASURES, or MEASURES *of Application*. The Engliſh ſtandard long meaſure for commerce, or that whereby the quantities of things are ordinarily eſtimated in the way of trade, is the yard, containing three Engliſh feet. Its diviſions are the foot, ſpan, palm, inch, and barley-corn; its multiples the pace, fathom, pole, furlong, and mile. The proportions theſe ſeverally bear to each other, are expreſſed in the following table:

English MEASURES of Length.

Barley-corns											
3	Inch										
9	3	Palm									
27	9	3	Span								
36	12	4	$1\frac{1}{3}$	Foot							
54	18	6	2	$1\frac{1}{2}$	Cubit						
108	36	12	4	3	2	Yard					
180	60	20	$6\frac{2}{3}$	5	$3\frac{1}{3}$	$1\frac{2}{3}$	Pace				
216	72	24	8	6	4	2	$1\frac{1}{5}$	Fathom			
594	198	66	22	$16\frac{1}{2}$	11	$5\frac{1}{2}$	$3\frac{3}{10}$	$2\frac{3}{4}$	Pole		
23760	7920	2640	880	660	440	220	132	110	40	Furlong	
190080	63360	21120	7040	5280	3520	1760	1056	880	320	8	Mile.

Scripture-MEASURES of Length reduced to Engliſh.

								Eng. feet.	inch. Dec.
Digit								0	0.912
4	Palm							0	3.648
12	3	Span						0	10.944
24	6	2	Cubit					1	9.888
96	24	8	4	Fathom				7	3.552
144	36	12	6	1½	Ezechiel's reed			10	11.328
192	48	16	8	2	1⅓	Arabian pole		14	7.104
1920	480	160	80	20	13⅓	10	Schœnus or meaſ. line	145	11.04

The Longer Scripture-MEASURES.

						English miles	English paces	English feet.
Cubit						0	0	1.824
400	Stadium					0	145	4.6
2000	5	Sab. day's journey				0	729	3.000
4000	10	2	Eaſtern mile			1	403	1.000
12000	30	6	3	Paraſang		4	153	3.000
96000	240	48	24	8	a day's journey	33	172	4.000

A Table of the MEASURES of Length of the principal Places in Europe, compared with the Engliſh Yard.

		Eng. yard.
100	Aunes or ells of England equal to	125
100	of Holland or Amſterdam	75
100	of Brabant or Antwerp	76
100	of France	128¼
100	of Hamburgh, Francfort, &c.	62½
100	of Breſlau	60
100	of Dantzick	66¾
100	of Bergen and Drontheim	68¼
100	of Sweden or Stockholm	65¾
100	of St. Gall, for linnens	87½
100	of ditto, cloths	67
100	of Geneva	124¾
100	Canes of Marſeilles and Montpelier	214½
100	of Toulouſe and High Languedoc	200
100	of Genoa, of 9 palms	245¼
100	of Rome	227¼
100	Varas of Spain	93¾
100	of Portugal	123
100	Cavidos of Portugal	75
102	Braſſes of Venice	73½
100	of Bergamo, &c.	71¼
100	of Florence and Leghorn	64
100	of Milan	58½

N. B. The aunes or ells of Amſterdam, Haerlem, Leyden, the Hague, Rotterdam, and other cities of Holland, as alſo that of Nuremberg, being all equal, are comprehended under that of Amſterdam; as thoſe of Oſnabrug are under thoſe of France; and thoſe of Bern and Baſil are equal to thoſe of Hamburg, Francfort, and Leipſic.

For the ſubdiviſions and multiples of each of theſe meaſures of length, ſee the article AUNE, &c.

For the proportion of the feet of the principal nations in Europe, compared with the Engliſh foot, ſee the article FOOT.

Square, or *Superficial* MEASURES. Engliſh ſquare or ſuperficial meaſures are raiſed from the yard of 36 inches multiplied into itſelf, and thus producing 1296 ſquare inches in the ſquare yard: the diviſions of this are ſquare feet and inches; and the multiples, poles, roods, and acres, as in the following table:

Engliſh Square-MEASURES.

Inches						
144	Feet					
1296	9	Yards				
3600	25	$2\frac{7}{9}$	Paces			
39204	272¼	30¼	10.89	Poles		
1568160	10890	1210	435.6	40	Rood	
6272640	43560	4840	1743.6	160	4	Acre.

Grecian ſquare-meaſures were the plethron, or acre, by ſome ſaid to contain 1444, by others 10000 ſquare feet; and the aroura, the half of the plethron. The aroura of the Egyptians was the ſquare of 100 cubits.

Cubical MEASURES, or *Meaſures of Capacity for Liquids.*—The Engliſh meaſures were originally raiſed from troy-weight; it being enacted by ſeveral ſtatutes that eight pounds troy of wheat, gathered from the middle of the ear, and well dried, ſhould weigh a gallon of wine-meaſure, the diviſions and multiples whereof were to form the other meaſures; at the ſame time it was alſo ordered, that there ſhould be but one liquid meaſure in the kingdom: yet cuſtom has prevailed, and there having been introduced a new weight, viz. the avoirdupois, we have now a ſecond ſtandard-gallon adjuſted thereto, and therefore exceeding the former in the proportion of the avoirdupois weight to troy weight. From this latter ſtandard are raiſed two ſeveral meaſures, the one for ale, the other for beer.

The ſealed gallon at Guildhall, which is the ſtandard for wines, ſpirits, oils, &c. is ſuppoſed to contain 231 cubic inches; and on this ſuppoſition the other meaſures raiſed therefrom, will contain as in the following table: yet by actual experiment, made in 1688, before the lord-mayor and the commiſſioners of exciſe, this gallon was found to contain only 224 cubic inches: it was however agreed to continue the common ſuppoſed contents of 231 cubic inches; ſo that all computations ſtand on their old footing. Hence as 12 is to 231, ſo is $14\frac{12}{20}$ to 281½ the cubic inches in the ale-gallon: but in effect the ale-quart contains 70½ cubic inches, on which principle the ale and beer-gallon will be 282 cubic inches. The ſeveral diviſions and multiples of theſe meaſures, and their proportions, are exhibited in the following tables:

English Measure of Capacity for Liquids.
Wine-meaſure.

Solid inches									
28⅞	Pint								
231	8	Gallon							
4158	144	18	Rundlet						
7276½	252	31½	1¾	Barrel					
9702	336	42	2⅓	1⅓	Tierce				
14553	504	63	3½	2	1½	Hogſhead			
19279	672	84	4⅔	2⅔	2	1⅓	Puncheon		
29106	1008	126	7	4	3	2	1½	Butt	
58212	2016	252	14	8	6	4	3	2	Tun.

Ale-Meaſure.

Pints					
8	Gallon				
64	8	Firkin			
128	16	2	Kilderkin		
256	32	4	2	Barrel	
384	48	6	3	1½	Hogſhead.

Beer-Meaſure.

Pints					
72	Gallon				
8	9	Firkin			
144	18	2	Kilderkin		
288	36	4	2	Barrel	
533	54	6	3	1½	Hogſhead.

Jewiſh Measures of Capacity for Liquids, reduced to Engliſh Wine-meaſure.

							Gall.	pints	Solid inches.
Caph							0	0⅝	0.177
1⅓	Log						0	0⅚	0.211
5⅓	4	Cab					0	3⅓	0.844
16	12	3	Hin				1	2	2.533
32	24	6	2	Seah			2	4	5.067
96	72	18	6	3	Bath, or Epha		7	4	15.2
960	720	180	60	30	10	Coron or Chomer	75	5	7.625

In the modern liquid-meaſures of foreign nations, it is to be obſerved, that their ſeveral veſſels for wine, vinegar, &c. have alſo various denominations, according to their different ſizes, and the places wherein they are uſed. The Woeders of Germany, for holding Rheniſh and Moſelle wines, are different in their gauges; ſome containing 14 aumes of Amſterdam meaſure, and others more or leſs. The aume is reckoned at Amſterdam for 8 ſteckans or 20 verges, or for ⅙ of a ton of 2 pipes; or 4 barrels of France or Bourdeaux, which ⅙ at this latter place is called tiercon, becauſe 3 of them make a pipe or 2 barrels, and 6 the ſaid ton. The ſteckan is 16 mingles, or 32 pints; and the verge is, in reſpect of the ſaid Rheniſh and Moſelle and ſome other ſorts of wine, of 6 mingles; but in meaſuring brandy, it conſiſts of 6⅙ mingles. The aume is divided into 4 anckers, and the ancker in to 2 ſteckans, or 32 mingles. The ancker is taken ſometimes for 1/24 of a ton, or 4 barrels, on which footing the Bourdeaux barrel ought to contain at Amſterdam (when the caſk is made according to the juſt gauge) 12½ ſteckans, or 200 mingles, wine and lees; or 12 ſteckans, or 192 mingles racked wine; ſo that the Bourdeaux ton of wine contains 50 ſteckans, or 800 mingles, wine and lees; and 48 ſteckans, or 768 mingles of pure wine. The barrels or poinçons of Nantes and other places on the river Loire, contain only 12 ſteckans Amſterdam meaſure. The wine ton of Rochelle, Cognac, Charente, and the Iſle of Rhé, differs very little from the ton of Bourdeaux, and conſequently from the barrels and pipes. A ton of wine of Chaloſſe, Bayonne, and the neighbouring places, is reckoned 60 ſteckans, and the barrel 15, Amſterdam meaſure.

The muid of Paris contains 150 quarts, or 300 pints, wine and lee; or 280 pints clear wine; of which muids 3 make a ton, and the fractions are,

The muid	containing	36 ſetiers
The ſetier		4 quarts
The quart		2 pints
The pint		2 chopins
The chopin		2 demi-ſetiers
The demi-ſetier		2 poiſſons.

The muid is alſo compoſed of pipes, or poinçons, quarteaux, queves, and demiqueves: theſe poinçons of Paris and Orleans contain about 15 ſteckans Amſterdam-meaſure, and ought to weigh with the caſk 666 ℔. a little more or leſs. In Provence they reckon by milleroles, and the millerole of Toulon contains 66 Paris-pints, or 100 pints of Amſterdam, nearly; and the Paris-pint is nearly equal to the Engliſh wine-quart.

The butts or pipes from Cadiz, Malaga, Alicant, Benecarlo, Saloe, and Mataro, and from the Canaries, from Liſbon, Oporto, and Fayal, are very different in their gauges, tho' in affreightments they are all reckoned two to the ton.

Vinegar is meaſured in the ſame manner as wine; but the meaſures for brandies are different: theſe ſpirits from France, Spain, Portugal, &c. are generally ſhipped in large caſks called pipes, butts, and pieces, according to the places from whence they are exported, &c. In France, brandy is ſhipped in caſks called pieces at Bourdeaux, and pipes at Rochelle, Cognac, the Iſle of Rhé, and other neighbouring places, which contain ſome more and ſome leſs: even from 60 to 90 Amſterdam-verges or veertels, according to the capacity of the veſſels, and the places they come from, which being reduced into barrels, will ſtand as follows, viz.

At Rochelle, Cognac, the Iſle of Rhé, and the country of Aunis	27 veertels	per barrel.
At Nants, and ſeveral places of Bretagne and Anjou — —	29 veertels	
At Bourdeaux, and different parts of Guienne — —	32 verges	
At Amſterdam, and other cities of Holland — — —	30 veertels	
At Hamburgh and Lubeck —	30 verges	
At Embden — —	27 verges	

In Provence and Languedoc, brandy is ſold by the quintal, the caſks included; and at Bruges, in Flanders, the verges are called ſeſters of 16 ſtops each, and the ſpirit is ſold at ſo much per ſtop.

Olive-oil is alſo ſhipped in caſks of various ſizes, according to the cuſtom of the places where it is embarked, and the conveniency of ſtowage. In England it is ſold by the ton of 236 gallons; and at Amſterdam by the ton of 717 mingles, or 1434 pints. In Provence it is ſold by milleroles of 66 Paris-pints: from Spain and Portugal it is brought in pipes, or butts, of different gauges; at the firſt place it is ſold by roves, whereof 40 go to the butt; and at the latter place by almoudas, whereof 26 make a pipe. Train-oil is ſold in England by the ton, at Amſterdam by the

MEASURES *of Capacity for Things dry.* Engliſh dry or corn-meaſures are raiſed from the Wincheſter-gallon, which contains $272\frac{1}{4}$ ſolid inches, and ought to hold of pure running water 9 pounds 13 ounces. This ſeems to ſtand on the foot of the old wine-gallon of 224 cubic inches, 12 being to $14\frac{12}{20}$ as 224 to $272\frac{1}{4}$; but by an act of parliament made in 1697 it is decreed, that a round buſhel, $18\frac{1}{2}$ inches wide, and 8 deep, is a legal Wincheſter-buſhel. Now ſuch a buſhel will only hold 2150.42 cubic inches, conſequently the gallon will hold 268.8 cubic inches, the diviſions and multiples whereof are in the following table:

Engliſh Dry or Corn-MEASURE.

Solid inches					
33.6	Pint				
268.8	8	Gallon			
537.6	16	2	Peck		
2150.4	64	8	4	Buſhels	
17203.2	512	64	32	8	Quarter.

Scripture MEASURES of Capacity for Things dry, reduced to Engliſh Corn-meaſure.

							Peck	Gal.	Pint.	ſolid inch. dec.
Gachal							0	0	$0\frac{17}{120}$	0.031
20	Cab						0	0	$2\frac{5}{6}$	0.073
36	$1\frac{4}{5}$	Gomer					0	0	$5\frac{1}{10}$	1.211
120	6	$3\frac{1}{2}$	Seah				1	0	1	4.036
360	18	10	3	Epha			3	0	3	12.107
1800	90	50	15	5	Leteeh		16	0	0	26.500
3600	180	100	30	10	2	Chomer, or Coron	32	0	1	18.969

In the ſeveral parts of Europe, ſalt, which is a more ſtaple and current commodity than any other, is bought and ſold by different meaſures, according to the ſeveral places of its diſpatch: at Amſterdam it is ſold by the cent of 404 meaſures, or ſcheppels, which cent is reckoned to be ſeven laſts, or 14 tons, and the laſt is to weigh 4000℔. the ſeven laſts making 28000℔. called the cent of ſalt, which alſo contains 208 ſacks; though ſome of this commodity is much heavier than others. In the cities of France, ſalt is ſold by the muid, whoſe ſize varies according to the different places of its manufacture and diſpatch. At Paris this meaſure is reckoned to contain 12 ſetiers, or 48 minots, which minot is alſo divided into other meaſures. The cent of ſalt from Marans, Brouage, Sude, and the Iſle of Rhé, contain 28 ſtricken muids, and each muid 24 boiſeaux, which yields at Amſterdam $11\frac{1}{2}$ laſts, or 23 tons, more or leſs. In Copenhagen, the ſaid cent renders only $9\frac{1}{2}$ laſts, the laſt being reckoned here equal to 18 tons, and 50 laſts to correſpond with 52 of Coningſberg, at which place the cent produces about 10 laſts, or 40,000℔. At Riga the ſaid cent yields the ſame meaſure as at Coningſberg, and about $6\frac{1}{4}$ laſts of Riga, make the great cent of Amſterdam. The ſaid French cent produces at Dantzick from $11\frac{1}{2}$ to 12 laſts, of which laſts from $7\frac{1}{4}$ to $7\frac{1}{2}$, make likewiſe the great cent of Amſterdam. At Stetin in Pomerania, the French cent yielded 10 laſts, making 40,000 meaſure and weight of the ſaid place. In Portugal it is bought by the muid, of which four make a laſt, and ſeven the cent of Amſterdam. At Alamat and Ivica it is ſold by the modin, which weighs from $27\frac{1}{2}$ to 28 hundred weight Engliſh.

MEASURE *of Wood*, for firing. See the article CORD *of Wood*.

MEASURE *for Horſes*, is the hand, which by ſtatute contains four inches.

MEASURE is alſo uſed to ſignify the cadence and time obſerved in poetry, dancing, and muſic, to render them regular and agreeable. See METRE.

MEASURE, in muſic, the interval or ſpace of time which the perſon who beats time takes between the riſing and falling of his hand, in order to conduct the movement ſometimes quicker and ſometimes ſlower, according to the muſic or ſubject that is to be ſung or played. See TIME.

MEATUS AUDITORIUS, in anatomy, the auditory paſſage. See the article EAR.

MECHANICS, that branch of mathematics which conſiders motion and moving powers, their nature and laws, with their effects in machines.

The knowledge of mechanics is one of thoſe things, ſays Mr Mac Laurin, that ſerves to diſtinguiſh civilized nations from barbarians. It is by this ſcience, that the utmoſt improvement is made of every power and force in nature; and the motions of the elements, water, air, and fire, are made ſubſervient to the various purpoſes of life: for however weak the force of man appears to be, when unaſſiſted by this art; yet, with its aid, there is hardly any thing above his reach. It is diſtinguiſhed, by Sir Iſaac Newton, into practical and rational mechanics; the former of which treats of the mechanical powers, viz. the lever, ballance, axis and wheel, pulley, wedge, ſcrew, and inclined plane. See the articles LEVER, BALLANCE, &c.

Rational mechanics comprehends the whole theory of motion; ſhews, when the powers or forces are given, how to determine the motions that are produced by them; and, converſely, when the phænomena of the motions are given, how to trace the powers or forces from which they ariſe. See MOTION.

MECHANICAL, an epithet applied to whatever relates to mechanics: thus we ſay, mechanical powers, cauſes, &c. See the articles POWER, CAUSE, &c.

The mechanical philoſophy is the ſame with what is otherwiſe called corpuſcular philoſophy. See the article CORPUSCULAR.

MECHANICAL, in mathematics, denotes a conſtruction of ſome problem, by the aſſiſtance of inſtruments, as the duplicature of the cube and quadrature of the circle, in contradiſtinction to that which is done in an accurate and geometrical manner.

MECHANICAL *Curve*, is a curve, according to Deſcartes, which cannot be defined by any algebraic equation: and ſo ſtands contradiſtinguiſhed from algebraic or geometrical curve.

Leibnitz and others call theſe mechanical curves tranſcendental, and diſſent from Deſcartes in excluding them out of geometry. Leibnitz found a new kind of trancendental equations, whereby theſe curves are defined: but they do not continue conſtantly the ſame in all points of the curve, as algebraic ones do.

MECHOACAN, in the materia medica, the root of an American convolvulus, brought chiefly from a province in Mexico of the ſame name, in thin tranſverſe ſlices, like jalap, but larger and whiter.

This root was firſt introduced about the year 1524, and continued in eſteem for a conſiderable time, as a mild cathartic, of very little taſte or ſmell, not liable to offend the ſtomach, of ſlow operation, but effectual and ſafe: by degrees it gave place to jalap, which has now, among us, almoſt wholly ſuperſeded its uſe. It ſeems to differ from jalap only in being weaker: the reſins obtained from the two roots have the ſame qualities, but mechoacan ſcarcely yields one ſixth part ſo much as jalap does, and hence requires to be given in much larger doſes to produce the ſame effects. The doſe of the mechoacan in ſubſtance is from one dram to two or more.

MECONIUM, in medicine, a black thick fœces gathered in the inteſtines of infants, and brought with them into the world at the time of their birth. The retention of theſe fœces is one of the diſeaſes to which infants are liable.

MECONIUM, in pharmacy, the extract of Engliſh poppies.

MEDAL, a piece of metal in the form of coin, intending to convey to poſterity the portrait of ſome great perſon, or the memory of ſome illuſtrious action.

The parts of a medal are the two ſides, one of which is called the face, or head, and the other the reverſe. On each ſide is the area, or field, which makes the middle of the metal; the rim, or border; and the exergue; and on the two ſides are diſtinguiſhed the type, or the figure repreſented, and the legend, or inſcription.

There was formerly no difference between money and medals. An old Roman had his purſe full of the ſame pieces that we now preſerve in cabinets. As ſoon as an emperor had done any thing remarkable, as gaining a victory, giving up a tax, or the like, it was immediately ſtamped on a coin, and became current through his whole dominions. This was a pretty device to ſpread abroad the virtues of an emperor, and make his actions circulate; and thus a freſh coin was a kind of gazette, that publiſhed the lateſt news of the emperor.

MEDALLION, or MEDALION, a medal of an extraordinary ſize, ſuppoſed to be anciently ſtruck by the emperors for their friends, and for foreign princes and embaſſadors; but that the ſmallneſs of their number might not endanger the loſs of the devices they bore, the Romans generally took care to ſtamp the ſubject of them upon their ordinary coins.

Medallions, in reſpect of the other coins, were the ſame as modern medals in reſpect of modern money: they were exempted from all commerce, and had no other value but what was ſet upon them by the fancy of the owner. Medallions are ſo ſcarce that there cannot be any ſet made of them, even though the metals and ſizes ſhould be joined promiſcuouſly.

MEDEOLA, in botany, a genus of the hexandria-trigynia claſs of plants, the flower of which conſiſts of ſix oblong, patent, and revolute petals: the fruit is a berry of a roundiſh form, with three cells, in each of which is contained a ſingle cordated ſeed.

MEDIAL, or ALLIGATION MEDIAL, in arithmetic. See ALLIGATION.

MEDIANA, a vein formed by the concourſe of the cephalic and baſilic veins in the bend of the elbow.

MEDIASTINUM, in anatomy, is a double membrane continuous to the ſternum, ſituated under it, and adhering firmly to it. It divides the cavity of the thorax longitudinally into two parts: but as it is not exactly under the middle of the ſternum, but ſomewhat to the left-ſide, the right part of the thorax is larger than the left.

MEDIASTINUM CEREBRI, the ſame with the tranſverſe ſeptum of the brain. See BRAIN.

MEDIATE, or **INTERMEDIATE**, ſomething that ſtands between and connects two or more terms, conſidered as extremes; in which ſenſe it is oppoſed to immediate.

MEDICAGO, in botany, a genus of the diadelphia-decandria claſs of plants, with a papilionaceous flower, and a long compreſſed and crooked pod for its fruit.

This genus comprehends the medicago, medica falcata, and cochleata of authors.

MEDICINE, *Medicina*, or *Phyſic*, the art of healing, which, according to Boerhaave, conſiſts in the knowledge of thoſe things, by whoſe application life is either preſerved ſound and healthy, or, when diſordered, again reſtored to its priſtine healthineſs.

Medicine is undoubtedly of the ſame date with diſeaſes, and diſeaſes are almoſt as ancient as the world itſelf. Men were long each his own phyſician; and it is hard to fix the time when it firſt was made an art and profeſſion. In certain countries thoſe who had been cured of ſome diſeaſe, wrote down how and by what remedies it had been affected, and depoſited thoſe accounts in the temples for the inſtruction of others in the like caſe. In other places, as Egypt and Babylon, the ſick were expoſed in public, that ſuch as paſſed by, who might have been cured of the ſame diſeaſe, might give them advice.

The Egyptians cultivated medicine both more anciently and more learnedly than any other people. The Greeks diſputed that glory with them, or at leaſt followed them very cloſe in it.

Before the Trojan war, Chiron the Theſſalian, ſurnamed the Centaur, who was Achilles's governor, made himſelf famous by the cure of wounds, and knowledge of ſimples. Æſculapius, Chiron's diſciple, did not give place to his maſter. Celſus places Pythagoras, Empedocles, and Democritus, in the number of celebrated phyſicians.

Phyſicians were diſtinguiſhed into different claſſes, namely, empirics, becauſe they followed experience almoſt entirely; others, of whom Hippocrates was the chief, joined reaſon with experience, hence called dogmatic or rational. Hippocrates firſt applied himſelf to the ſtudy of natural things in general, and afterwards to that of the human body in particular. He made a great proficiency in all the parts of phyſic. He was born 460 years before Chriſt, and was cotemporary with Democritus. He compiled a body of Greek medicine, which continued a long time ſacred and unaltered, and was the ſtanding practice of many ages. At length Aretæus the Cappadocian digeſted it into an orderly body; after which it was ſeveral times altered and improved, till at length it was taken in hand by Galen of Pergamos, who lived in the year 131. He aſcribed all he knew to Hippocrates, and explained every thing by the rigid doctrines of the peripatetics; and did both a great deal of ſervice, and a great deal of miſchief to the art; he being the firſt who introduced the doctrine of the elements, the cardinal qualities, the degrees, the four humours, &c. into medicine, and on which he made the whole art depend.

Other famous phyſicians after Hippocrates, were Diocles Caryſtius, Praxagoras, Chryſippus, Eraſiſtrates, Herophilus, Serapion, Apollonius, Glaucias, Heraclides, Tarentinus, Dionyſius, Crito, Menodotus, Theodas, Aſclepiades, Themiſon, Theſſalus, Soranus, Cælius Aurelianus, Celſus, Oribaſius, Aetius, Alexander Trallianus, Paulus Ægineta, Actuarius, Myrepſus, &c.

Phyſic had for ſome time got almoſt entirely into the hands of the Arabians, till the end of the fifteenth century, when the original authors, moſt of which they had tranſlated, came to be read in their own language; at length, the immortal Harvey, overturning the whole theory of the ancients, by the diſcovery of the circulation of the blood, laid a new and certain baſis for medicine. Since his time, it is improved by ſure diſcoveries in anatomy, chemiſtry, mechanics, &c.

It does not appear that phyſicians were very common among the Hebrews, eſpecially for internal maladies; but for wounds, fractures, bruiſes, and all external injuries, they had phyſicians who underſtood the dreſſing of them, and the application of certain medicaments, as roſin, balm, fat, &c. The Jewiſh authors ſpeak very unfavourably of phyſicians.

We are told by Pliny, that Archagathus of Peloponneſus was the firſt phyſician that came to Rome in the conſulſhip of L. Æmilius and L. Julius, A. U. C. 535. That is, the Romans, till his arrival, uſed only the ſimple empiric kind of phyſic, ſuch as was practiſed by the firſt men. It ſeems, however, that ſeveral phyſicians came from Greece to Rome, though Cato had oppoſed it with his whole power.

Till Pliny's time, of all profeſſions, that of medicine, as gainful as it was, was the only one no Roman had followed, becauſe they thought it below them.

Without entirely deciding, as to the merit of the ancient and modern phyſic, they have each their peculiar advantages, which render both highly eſtimable; and no doubt but the experience of many ages muſt have added conſiderable lights to the knowledge of the ancients. The new diſcoveries which have enriched the phyſic of the moderns may give it the preference to that of the ancients.

The phyſic of the ancients is perhaps to be preferred to that of the moderns, in being leſs profuſe of medicines in ſickneſs, and leſs deſirous to precipitate cures; in obſerving the motions of nature with more attention, and aſſiſting them with greater confidence; and in being contented to divide the honour of the cure with nature, without arrogating the whole glory of it to itſelf.

Phyſic, however uſeful and ſalutary, has had the misfortune of being made the butt of great men, eſpecially among the Romans. Cato declared himſelf moſt ſtrenuouſly againſt phyſicians, as we ſee in a letter to his ſon preſerved by Pliny; but it is to be obſerved, that he means only the phyſicians from Greece. Pliny the naturaliſt was of much the ſame way of thinking, but his complaints extend only to perſons of no repute, authority, or learning.

Extremes are not to be admitted upon this head, in which blind confidence and ill-grounded contempt may be equally dangerous.

In ſhort, whether we conſider our bodies or our medicines, phyſic muſt be very precarious. Our bodies are more compounded and unequal than other bodies are; moſt other creatures live on a ſimple diet, and are regular in their appetites; whereas man feeds almoſt upon every thing, and, where appetite fails, invention is called in to ſwell the account by high ſauces and rich ſpices. Hence proceed ſuch variety of diſeaſes as diſtract the phyſician's ſkill. A healthy conſtitution is eaſily reſtored when out of order, nature in a great meaſure does its own work; whereas, in a diſordered body, a phyſician muſt give a new conſtitution before he can perfect the cure.

Though our materia medica be large enough, and to look into our diſpenſatories, one would think no diſeaſe incurable; yet the miſchief is, all thoſe fine medicines do not always anſwer in the application, nor have they been found ſo ſovereign in our bodies, as they are in our books: all which things have ſo diſtracted our phyſicians that they vary even in the moſt common method. In one age alkalies are in faſhion, and in the next acids begin to recover credit: bleeding is practiſed by one nation, and condemned by their neighbours, &c.

Medicine is divided into five principal branches: the firſt conſiders the human body, life, and health, and the effects flowing therefrom; this is called phyſiology, the doctrine of the œconomy or uſe of the parts; and its objects are called res naturales, or things according to nature.

The ſecond branch conſiders the diſeaſes of the human body, their differences, cauſes, and effects: as it conſiders diſeaſes, it is called pathology; as it enquires into the cauſes, ætiology; when it examines their differences, it is called noſology; and when it explains their effects, ſymptomatology. The objects of this branch are called res preternaturales, or beyond nature.

The third branch conſiders the ſigns or ſymptoms, and how to apply them to uſe; ſo as to judge both in a ſound and diſeaſed body what is or will be the degree, order, and effect of the health or diſeaſe. This is called ſemeiotica. Its objects are things both natural, non-natural, and preternatural.

The fourth branch conſiders the remedies and their uſe, whereby life may be preſerved; whence it is called hygieine. Its objects are what we ſtrictly call non-natural.

The fifth furniſhes the materia medica, its preparation and manner of exhibiting, ſo as to reſtore health; and is called therapeutica, comprizing the diætetica, pharmaceutica, chirurgica, and iatrica.

MEDICINES, *Medicamenta*, whatever ſubſtances ſerve to reſtore health.

MEDIETAS LINGUÆ, in law, ſignifies a jury, or inqueſt impannelled, of which the one half are natives of this land, and the other foreigners.

MEDITULLIUM is uſed by anatomiſts for that ſpungy ſubſtance between the two plates of the cranium, and in the interſtices of all laminated bones. See the article DIPLOE.

MEDIUM, in logic, the mean or middle term of a ſyllogiſm, being an argument, reaſon, or conſideration for which we affirm or deny any thing: or, it is the cauſe why the greater extreme is affirmed or denied of the leſs in the concluſion.

MEDIUM, in philoſophy, that ſpace or region through which a body in motion paſſes to any point; thus æther is ſuppoſed to be the medium through which the heavenly bodies move; air, the medium wherein bodies move near our earth; water, the medium wherein fiſhes live and move; and glaſs is alſo a medium of light, as it affords it a free paſſage. That denſity or conſiſtency in the parts of the medium, whereby the motion of the bodies in it is retarded, is called the reſiſtence of the medium, which together with the force of gravity, is the cauſe of the ceſſation of the motion of projectiles.

Subtile, or *Ætherial* MEDIUM. See ÆTHER.

MEDLAR, *Meſpilus*, in botany, &c. See the article MESPILUS.

MEDULLA, MARROW, in anatomy. See MARROW.

MEDULLA OBLONGATA, is the lower and medullary part of the cerebrum and cerebellum, formed into a kind of tail, and extended to the great foramen or hole in the occipital bone of the cranium, where it gives origin to the ſpinal marrow, and to the nerves of the brain. See the articles BRAIN and NERVE.

MEDULLA SPINALIS, or ſpinal marrow, is a continuation of the medulla oblongata of the brain, and forms, as it were, a tail to that part. It is included in a kind of bony canal, formed by the vertebræ, and in this is continued from the head to the extremity of the os ſacrum. Its length is therefore the ſame with that of the ſpina dorſi, which is different in perſons of different ſtature. Its thickneſs, in general, is nearly equal to that of a finger; but it is not uniformly of the ſame diameter throughout. Its ſubſtance, in the upper-part, as far as to the laſt vertebra of the thorax, is the ſame with that of the medulla oblongata of the brain, but ſomewhat tougher and more firm: they are externally of a medullary ſubſtance, that the nerves may eaſily make their way out; internally cineritious, and of the ſame nature with the cineritious or cortical part of the brain; but the lower part of them, from the laſt vertebra of the thorax to the extremity of the os ſacrum, is fibrous and very tenacious, and is called cauda equina. The diviſion of the ſpinal marrow is formed by means of a fiſſure; it is by this ſeparated into a right and left part, or into two columns; but this ſeparation is not continued to the center. Its proper integuments are no leſs than ſix: theſe are, 1. the bony canal, formed by the cavities of the twenty-four vertebræ, and the os ſacrum: 2. the tunica, which is very ſtrong, and connects the vertebræ within: 3. the cellular, or adipoſe coat, which, in fat perſons, always contains more or leſs fat, and ſeems deſtined by nature to ſoften the former: 4. the dura mater, which is ſtronger in the upper-part, and finer and weaker in the lower; this looſely incloſes the medulla in the ſpine, and in its anterior part is firmly connected with the vertebræ: 5. the tunica arachnoides, which in its anterior part, adheres very firmly to the pia mater, but in its poſterior part is looſe and fluctuating: 6. the pia mater, which ſurrounds every part of the ſpinal marrow, and all the nerves that ariſe from it, and enters alſo its longitudinal diviſion. The arteries and veins of the ſpinal marrow enter at the apertures of the vertebræ, which give paſſage out to the nerves; they make a multitude of anaſtomoſes, and are derived from the vertebrals of the neck, the intercoſtals and the lumbar. The nerves of the ſpine are thirty-one, or as others count them, thirty-two pair. Theſe are compoſed each of a multitude of fibres, ariſing from the anterior and poſterior parts of the medulla: theſe fibres afterwards unite, and are connected by, and covered with membranes, and in that ſtate they conſtitute what we call nerves.

The uſes of the ſpinal marrow are, to give origin to the before-mentioned pairs of nerves, which are principally diſtributed to the limbs and external parts; and to ſecrete and prepare a nervous fluid.

MEDUSA's Head, in aſtronomy. See the article Algol.

Medusa's Head, in botany, the Engliſh name for a ſpecies of euphorbium. See Euphorbium.

MEI, or Miserere Mei, in medicine. See Miserere.

MEL, Honey. See he article Honey.

MELAMPYRUM, cow-wheat, in botany, a genus of plants, whoſe flower is monopetalous and ringent. The fruit is an oblong, acuminated, compreſſed capſule, with two cells, containing two ovate twin ſeeds.

MELANCHOLY, in medicine, a ſpecies of madneſs, being a kind of a delirium without a fever, uſually attended with fear, heavineſs, and ſorrow, without any apparent cauſe. It is infinitely varied according to the temperament and ideas of the perſon affected therewith. See Madness.

The word is Greek, *μελαγχολια*, and formed of *μελας*, black, and *χολη*, bile or gall.

The cauſes evidently productive of melancholy are obſerved to be,

1. All things which fix, exhauſt, or diſturb the nervous fluid of the brain; ſuch as violent and ſudden frights, intenſe thinking upon any ſubject, exceſſive love, watchings, ſolitude, fear, and hyſteric diſorders.

2. Such things as hinder and diſturb the generation, reparation, circulation, and various ſecretions and excretions of the blood, eſpecially in the ſpleen, ſtomach, omentum, pancreas, meſentery, inteſtines, liver, uterus, and hæmorrhoidal veſſels: ſo that, of conſequence, melancholy may be produced by the hypochondriacal diſorder; by acute diſeaſes ill cured, and eſpecially a phrenitis and burning fever; by an exceſs of all the ſecretions and excretions; by ſuch aliments and drinks as are cold, tenacious, terreſtrial, tart, and aſtringent; by violent heat long protracted and parching the blood; as alſo by a ſtagnant, moiſt, and cloudy air.

3. A naturally black, hairy, dry, ſlender, and robuſt conſtitution of body, a middle age, a quick, penetrating, and diſcerning genius.

If this diſorder continues long, it produces ſtupidity, epilepſies, apoplexies, madneſs, convulſions, blindneſs, ſurpriſing fancies, laughter, weeping, ſinging, ſighs, eructations, flatulencies, anxieties; an urine ſometimes copious and limpid like water, and at others highly thick; a retention, accumulation of the excrementitious blood in the veſſels of the abdominal viſcera, and often a ſudden excretion of it; obſtinate coſtiveneſs, frequent ſpitting of a thin matter, and an incredible ability of enduring watchings, hunger, and cold.

This diſorder has often been cured by a ſupervening unſeemly itch, ſometimes reſembling an elephantiaſis; by numerous and large varices; by a copious diſcharge from the turgid hæmorrhoidal veins; and an evacuation of the black bile by vomit and ſtool.

Patients labouring under this diſorder are generally injured by all medicines which impair the ſtrength, and evacuate too forcibly; as alſo by thoſe which throw the humours into too violent commotions, whether cordials, or medicines of whatever denomination.

Hence the beſt method of curing this diſorder is, after a due obſervation of the firſt cauſes and the variety of patients conſtitutions, to accommodate various medicines to theſe cauſes, and various conſtitutions.

The ſeveral intentions of cure to be purſued, therefore, are, 1. To rouſe, augment, and regulate the fluids of the brain and nerves; which is done, firſt, by diverting the mind from its uſual object to others of an oppoſite nature: ſecondly, by inducing cautiouſly another diſpoſition, or affection of mind, oppoſite to melancholy: thirdly, by humouring the perverſe and falſe turn of the imagination: or, fourthly, by frequently oppoſing it with great vigour.

2. To remove thoſe obſtructions which are either the cauſe, or the effect, of a perverted imagination, by ſoftening, inciding, and ſtimulating the obſtructing matter, by means of mineral waters, whey, viſceral, hepatic, and antihypochondriac decoctions, waters invigorated with lixivial or compound ſalts, laxitive preparations of mercury, emetics, motion, exerciſe, riding, ſailing, uterine medicines, and ſuch as promote the lochia, remedies which procure hæmorrhoidal diſcharges, baths, liniments, and plaſters.

3. To alleviate the ſymptoms by veneſection, immerſion in cold waters, and the uſe of carminatives and opiates.

4. After due evacuations, to exhibit ſuch things as are from experience known to exhilarate the mind, and corroborate all the parts of the body.

From what has been ſaid, it is obvious that the perfect cure of this diſorder, as well as of a great many others falſly accounted incurable, conſiſts in the correction of the bilis atra, or melancholic humour.

When melancholy increaſes ſo far as to bring on an agitation of the fluids of the brain, capable of driving the patient into a raging fury, the diſorder is called madneſs.

This only differs in degree from a dejected melancholy, is its offspring, ariſes from the ſame cauſes, and is generally to be cured by the ſame medicines.

In madneſs the muſcles are generally ſurpriſingly ſtrong, the patient is afflicted with watchings, incredibly capable of enduring hunger and cold, diſtracted by terrible imaginations, and ſubject to thoſe diſorders called lycanthropia and cynanthropia; which ſee.

It is obſervable, that, upon diſſecting thoſe who have died of madneſs, the brain has been found dry, hard, and friable, with its cortical ſubſtance of a yellow colour, and its veſſels turgid, varicoſe, and diſtended with black and viſcid blood.

It is alſo obſervable, that, during this diſorder, all the excretions have, in like manner, almoſt ceaſed.

Unexpected precipitation into the ſea, and a ſubmerſion in it, continued as long as poſſible, conſtitute the principal remedy for it.

Madneſſes, obſtinate againſt all remedies, have often been removed upon the approach of varices, hæmorrhoidal diſcharges, dyſenteries, dropſies, copious ſpontaneous hæmorrhages, tertian and quartan fevers.

Such a ſort of madneſs ſometimes ariſes after the body is, by an autumnal, violent, and long-continued intermittent fever, weakened and exhauſted, both by the force of the diſeaſe, and repeated veneſections and purgings. The madneſs is alſo generally brought on again by theſe very means.

This ſpecies of the diſorder is only to be cured by the uſe of reſtoratives, cardiacs, and corroboratives, long perſiſted in; but, if it is treated with evacuation, it brings on an atrophy, a weakneſs, and an unſurmountable fooliſhneſs.

But a madneſs ariſing in robuſt vigorous perſons, in the flower of their age, or of hot and plethoric habits, is to be cured by repeated veneſections, interpoſing a briſk purge between each; and when the diſorder is alleviated, it is to be treated with opiates and cardiacs. *Boerhaave's Aphoriſms.*

MELANE, among phyſicians. See the article ALPHOS.

MELANTERIA, in natural hiſtory, a very beautiful foſſil, of a denſe, compact, and regular texture, and of an extremely bright pale yellow, reſembling nothing ſo much as the pureſt gold: it is remarkably heavy, and is uſually found in little irregular maſſes, of the bigneſs of a pigeon's egg, which are broken with a ſlight blow; but it is uſually met with in the form of a fine gold-coloured efflореſcence or vitriolic and pyritical bodies; or in looſe, ſhattery, and friable maſſes, of a more duſky yellow, in which latter ſtate, it ſo much reſembles a native ſulphur, that it is frequently miſtaken for one: however, it is not inflammable, but calcines in the fire to a greyiſh powder, which by burning longer, changes to a deep and fine purple.

MELANTHIUM, in botany, a genus of plants whoſe flower conſiſts of ſix ovato oblong, patent petals, with ſix erect ſlender filaments, topped with globoſe antheræ: the fruit is an ovate trigonal capſule, with three cells, which contain a number of compreſſed ſemi-ovate ſeeds.

MELAPODIUM, in botany, a genus of plants whoſe flower is compound and radiated; the particular hermaphrodite corollulæ are ſituated in the diſk, and the female ones form the rays: the ſtamina are five very ſmall filaments, topped with tubuloſe cylindraceous antheræ: the ſeeds are oval, compreſſed, three-cornered, and placed on a conic paleaceous receptacle.

MELASSES, or MOLASSES. See the article MOLASSES.

MELASTOMA, in botany, a genus of plants, the flower of which conſiſts of five roundiſh petals, with ten ſhort filaments inſerted in a ventricoſe cup; theſe are terminated by long erect antheræ, a little curved: the fruit is a roundiſh quinquelocular berry, containing many ſmall ſeeds.

MELCHITES, in church hiſtory, the name given to the Syriac, Egyptian, and other Chriſtians of the Levant. The Melchites, excepting ſome few points of little or no importance, which relate only to ceremonies and eccleſiaſtical diſcipline, are in every reſpect profeſſed Greeks; but they are governed by a particular patriarch, who reſides at Damas, and aſſumes the title of Patriarch of Antioch.

MELCHIZEDECHIANS, in church hiſtory, a ſect which aroſe about the beginning of the third century, and affirmed, that Melchizedech was not a man, but a heavenly power, ſuperior to Jeſus Chriſt; for Melchizedech, they ſaid, was the interceſſor and mediator of the angels, but Jeſus Chriſt was ſo only for men, and his prieſthood only a copy of that of Melchizedech. This hereſy was revived in Egypt by one Hierax, who pretended that Melchizedech was the Holy Ghoſt.

MELEAGRIS, the turkey, in ornithology. See TURKEY.

MELES, the badger, in zoology. See the article BADGER.

MELIA, the bead-tree, in botany, a genus of plants, whoſe flower conſiſts of a ſmall monophyllous cup, cut into five obtuſe ſegments at the top, with five narrow lanceolated petals which ſpread open, and a cylindraceous nectarium: the ſtamina are ten ſmall filaments, inſerted in the top of the nectarium, terminated by oblong antheræ: the fruit is a ſoft globular drupe, containing a roundiſh nut, having five furrows and five cells, each containing an oblong ſeed.

MELIANTHUS, honey-flower, in botany, a genus of plants whoſe flower is compoſed of four lanceolated petals, which are reflexed at their points: the fruit is a quadrangular capſule, containing four globoſe ſeeds.

MELICA, in botany, a genus of plants, whoſe flower is compoſed of two valves, not ariſtated: it hath no pericarpium; but the ſeed, which is ſingle and ovate, is included in the corolla.

MELICERES, in ſurgery, a kind of encyſted tumours, ſo called when their contents are of the conſiſtence of honey; but when this is of the conſiſtence of paſte, they are called a theromata.

MELILOT, in botany, a ſpecies of trifolium: it grows naturally in ſeveral parts of England: the flowers are produced in long ſlender ſpikes, which come out from the wings of the ſtalks; they are papilionaceous, and of a bright yellow colour.

In pharmacy, melilot is ſcarce ever given internally; but in external uſe, it is a great emollient, reſolvent, and digeſtive: it is a good ingredient in cataplaſms and fomentations, and alſo in clyſters. The flowers are recommended by ſome, in infuſion, as a remedy againſt the fluor albus.

MELISSA, baum, in botany. See the article BAUM.

MELITTIS, in botany, a genus of plants, whoſe flower is monopetalous and ringent; the upper lip is plane, erect, and roundiſh, and the lower one is trifid and obtuſe: the ſeeds, which are four in number, are placed in the bottom of the cup.

MELOCHIE, in botany, a genus of plants, whoſe flower conſiſts of five large, cordated, ſpreading petals: the fruit is a roundiſh capſule, having five cells, each containing a ſingle ſeed.

MELODY, in muſic, the agreeable effect of different ſounds, ranged and diſpoſed in ſucceſſion; ſo that melody is the effect of a ſingle voice or inſtrument, by which it is diſtinguiſhed from harmony. See HARMONY.

MELON, in botany, makes a diſtinct genus of plants, the flowers of which conſiſt only of one leaf each, and are wide at the mouth, and divided into ſeveral ſegments, wholly reſembling the flowers of cucumbers: of theſe alſo, ſome are male or ſterile flowers, having no embryo fruit; others are fruitful or female flowers, having an embryo, which ripens into a large fruit of an oval figure, ſometimes ſmooth, ſometimes rough, divided into three cells, and containing oblong ſeeds; each of theſe cells ſeems alſo to be divided into two.

There are great varieties of melons, but the beſt ſorts we know of are the Romana and Cantaleupe melons, ſo called from the places where they have been firſt propagated in Europe, though they originally came from ſome parts of Aſia. They are raiſed on hot-beds, nearly in the ſame manner as thoſe of cucumbers; but the earth in which they grow, ſhould be much ſtronger, and not more than two plants to one light; theſe, as they advance in growth, ſhould be trained thin and regularly, ſo as to prevent confuſion among the branches, being previouſly pinched off at the ſecond joint, which produces lateral ſhoots, whoſe extremities ſhould alſo be pinched off when they have five or ſix joints; this will occaſion freſh branches to iſſue forth, which produce the fruit; theſe branches ſhould likewiſe be pinched off at the joint beyond the fruit, which will help to ſet them, they being very liable, in bad weather, to turn yellow and come to nought; therefore, they are not ſet with certainty till they are arrived to the ſize of a hen's egg. Some, to ſet the fruit, uſe the method of taking the male flower, and ſtriking its farina into the eye of the female flower, in order to impregnate the fruit, which is very proper, particularly to thoſe early-raiſed plants, that can admit of but a ſmall ſhare of air being given them on account of its coldneſs. (See the article *Generation of* PLANTS). The fruit, when fully grown, ſhould be often noticed for their being cut at a proper time, which is known by the ſtalk cracking round the part which join to the fruit, as likewiſe by the ſmell; but for thoſe kinds of Cantaleupe melons whoſe rinds are thick, it is neceſſary to let them be on the branch a day longer than the other ſorts after they have ſhewn the marks of ripeneſs; and if they are cut early in the morning, before the ſun has warmed them, they will be much higher flavoured.

It may be neceſſary to obſerve, that the larger the glaſſes are, the better it will be for the plants, and the greater number of fruit will be obtained, which will alſo be larger and richer flavoured than thoſe raiſed in the contracted glaſſes commonly uſed, which are not above four feet and a half in depth, which greatly prevents the plants from extending themſelves, and makes it neceſſary either to pinch them too cloſe, to keep them within the frame, or elſe the box muſt be raiſed to let them out underneath when the ſeaſon will not admit of it, but this is to be underſtood of thoſe which are raiſed in February or March; about ſix feet is a very good width for a melon-frame.

The firſt ſeaſon for ſowing melon-ſeeds is in January, and the laſt the latter end of April or beginning of May.

The ſeeds of melons are reckoned among the greater cold ſeeds; they are eſteemed cooling and diuretic; they ſerve to make emulſions, but at preſent they are not ſo much noticed as formerly.

MELONGENA, mad-apple, in botany, a genus of plants, whoſe flower is monopetalous, with a ſhort tube, and the limb cut into five ſegments, which are plicated and reflexed; the ſtamina are five ſmall ſubulated filaments, terminated by oblong connivent antheræ. The fruit is a ſmooth, egg-ſhaped berry, with a fleſhy pulp, having one cell, which contains a number of roundiſh compreſſed ſeeds.

A ſpecies whoſe fruit is white and much reſembling an egg, is raiſed with us in the ſpring, on a common hot-bed, from ſeed, and afterwards tranſplanted in borders or pots as other annual plants are; theſe are preſerved merely for the ſhew of the fruit; but in the warm parts of the globe they are eaten as a delicacy, which not in the leaſt ſuits an Engliſh palate.

MELON-THISTLE, *Cactus*, in botany, a genus of plants ſhaped like a melon, with deep ribs beſet with ſtrong ſpines, and of a green colour; ſome of which are crowned with a prickly brown cap, which gives them a ſingular appearance. The flower is hexapetalous, and ſpreads open at the top, and the fruit is a fleſhy berry with one cell, containing a number of angular ſeeds. Theſe plants are natives of the warmeſt parts of America, growing in the apertures of the rocks, having little or no earth to ſupport them; therefore we are directed that thoſe which are kept here ſhould not have a rich ſoil for their ſupport; the moſt proper for theſe plants is the rubbiſh of old buildings: they require to be kept in a hot-houſe conſtantly, and in winter ſhould have ſcarce any water given them. To this genus Linnæus has joined the cereus and opuntia of other authors.

MEMBRANE, in anatomy, a pliable texture of fibres, interwoven together in the ſame plane.

The membranes differ in thickneſs, according to the ſmallneſs of their fibres, or the number of their planes. Theſe particular planes are termed laminæ, and are diſtinguiſhed into internal, external, and middle. The difference of membranes, in general, depends on that of the fibres of which they are compoſed. Small portions of membranes, eſpecially when they are very thin, are called pellicles, and called the cellular or ſpongy ſubſtance.

MEMBRANOSUS, in anatomy, a muſcle otherwiſe called faſcia lata.

MEMOIRS, in matters of literature, a ſpecies of hiſtory, written by perſons who had ſome ſhare in the tranſactions they relate, anſwering to what the Romans call *commentarii*, commentaries.

MEMORY, *Memoria*, a faculty of the human mind, whereby it retains or keeps the ideas it has once perceived. See IDEA.

Memory (ſays Mr. Locke) is, as it were, the ſtore-houſe of our ideas; for the narrow mind of man not being capable of having many ideas under view at once, it was neceſſary to have a repoſitory, in which to lay up thoſe ideas which it may afterwards have uſe of. But our ideas being nothing but actual perceptions in the mind, which ceaſe to be any thing where there is no perception of them; this laying up of our ideas in the repoſitory of the memory, ſignifies no more than this, that the mind has a power, in many caſes, to revive perceptions it has once had, with this additional perception annexed to them, that it has had them before. And it is by the aſſiſtance of this faculty, that we are ſaid to have all thoſe ideas in our underſtandings which we can bring in ſight, and make the ſubjects of our thoughts, without the help of thoſe ſenſible qualities which firſt imprinted them there.

Attention and repetition help much to the fixing ideas in our memories: but thoſe which make the deepeſt and moſt laſting impreſſions, are thoſe which are accompanied with pleaſure and pain. Ideas but once taken in, and never again repeated, are ſoon loſt; as thoſe of colours, in ſuch as loſt their ſight when very young.

The memory of ſome men is tenacious even to a miracle: but yet there ſeems to be a conſtant decay of all our ideas, even of thoſe which are ſtruck deepeſt, and in minds the moſt retentive: ſo that, if they be not ſometimes renewed, the print wears out, and at laſt there remains nothing to be ſeen.

Thoſe ideas that are often refreſhed, by a frequent return of the objects or actions that produce them, fix themſelves beſt in the memory, and remain longeſt there: ſuch are the original qualities of bodies, viz. ſolidity, extenſion, figure, motion, &c. and thoſe that almoſt conſtantly affect us, as heat and cold.

In memory, the mind is often more than barely paſſive; for it often ſets itſelf on work to ſearch ſome hidden ideas; ſometimes they ſtart of their own accord; and ſometimes tempeſtuous paſſions tumble them out of their cells. This faculty, other animals ſeem to have to a great degree, as well as men, as appears by birds learning tunes, and their endeavour to hit the notes right. For it ſeems impoſſible that they ſhould endeavour to conform their voices, as it is plain they do, to notes whereof they have no idea.

Local MEMORY, among orators, is nothing but the aſſociating the different heads to be handled, with the objects before the ſpeaker's eyes; ſo that, by only looking around him, he is put in mind of what he is to ſay.

Artificial MEMORY, *Memoria Technica*, a method of aſſiſting the memory, by forming certain words, the letters of which ſhall ſignify the date or æra to be remembered.

MENDICANTS, or begging friars, ſeveral orders of religious in Popiſh countries, who having no ſettled revenues, are ſupported by the charitable contributions they receive from others.

MENIALS, in law books, domeſtic or houſhold ſervants, who live under their lord or maſter's roof.

MENINGES, or MENYNGES, in anatomy, a name given to the dura and pia mater of the brain.

MENIPPEAN, in poetry, a kind of ſatire, conſiſting of proſe and verſe intermixed.

MENISCUS, in optics, a lens, convex on one ſide and concave on the other. See LENS.

For finding the focus of a meniſcus, the rule is, as the difference of the ſemi-diameters of the concavity and convexity, to the ſemi-diameter of the concavity; ſo is the diameter of the convexity to the focal diſtance.

MENNONITES, a ſect of baptiſts in Holland, ſo called from Mennon Simonis of Friezeland, who lived in the ſixteenth century.

This ſect believe, that the New-Teſtament is the only rule of faith; that the terms Perſon and Trinity are not to be uſed in ſpeaking of the Father, Son, and Holy Ghoſt; that the firſt man was not created perfect; that it is unlawful to ſwear or to wage war upon any occaſion; that infants are not the proper ſubjects of baptiſm; and, that miniſters of the Goſpel ought to receive no ſalary.

MENOLOGY, the Greek calendar, in which the lives of the ſaints in ſhort, or barely their names, are cited; anſwering nearly to the martyrology of the Latin church.

MENSALS, *Menſalia*, in church hiſtory, ſuch livings as were formerly united to the tables of religious houſes, and hence called menſal benefices.

MENSES, *Catamenia*, fluors, courſes, in medicine, are the monthly evacuations from the uterus of women not with child, and not giving ſuck.

The word is derived from the Latin *menſis*, a month, the period wherein they generally return.

The common cauſe of the ſtoppage of the menſtrual diſcharges is the blood's lentor; whereby this fluid becomes incapable of forcing the ſphincters of the ducts deſtined by nature for this evacuation. For it is not from the burſted arteries of the uterus, which is the common opinion, that the blood iſſues every month, but from veſſels peculiarly appropriated to this office. And this lentor, or thickneſs of the blood, changes the lively colour of the face into a greeniſh, pale, and wan complexion.

The proper medicines, in this diſtemper, are thoſe which are capable of increaſing the blood's circulation, and attenuating the viſcid humours: and ſuch are all bitters, joined with aromatics; as alſo many preparations of ſteel. But to theſe ought to be premiſed blood-letting, and cathartics blended with calomel. The tinctura ſacra is alſo an excellent medicine.

But of all the moſt powerful emmenagoges, I have found ſo ſingular virtue in black hellebore, that I hardly remember it ever failed anſwering my expectation. My way of ordering it is, a tea-ſpoonful of tincture of black hellebore in a glaſs of warm water, to be taken twice a day. And I have obſerved this remarkable circumſtance, that whenever, either from a bad conformation of the parts, or any other cauſe, this medicine had not the deſired effect, the blood was forced through ſome other paſſages; which is a manifeſt proof of the great power of this medicine in ſpurring the blood forward.

But likewiſe the menſtrual diſcharges frequently run to exceſs. In that caſe, the flux is to be reſtrained; which, after letting blood, is effected, both by thoſe medicines which condenſe and inſpiſſate the blood and by thoſe which allay its heat. Of the firſt ſort, the principal are ſuch as participate of vitriol or alum; eſpecially the tincture of roſes; or a powder compoſed of alum three parts, and dragon's-blood one part, melted together. But the heat of the blood, and its conſequence, the flux, is more powerfully checked by the Peruvian bark, than by any other medicine whatſoever. *Mead.*

MENSTRUUM, or DISSOLVENT, in chemiſtry, a body which, when artificially applied to another, divides its ſubtility, ſo that the particles of the ſolvent remain thoroughly intermixed with thoſe of the ſolved.

It was called a menſtruum, becauſe the chemiſts, in its application to the ſolvend, firſt uſed a moderate fire, for a philoſophical month, or forty days; and hence aroſe the name of menſtrual ſolvent, at length barely a menſtruum.

It is the property of a menſtruum to be itſelf equally diſſolved, when it diſſolves the ſolvend; but when the ſolution is perfected, it may ſometimes happen that the ſolvent and ſolvend ſhall ſeparate. The divided parts, therefore, of a ſolvent, muſt inſinuate itſelf among the parts of the ſolvend, ſo as to divide and diſſolve the body. Hence it appears, that the actions of menſtruums differ from all mechanical ſeparations, where the inſtrument, ſuch as a knife, ſword, or ſaw, while it divides, is not itſelf divided, but remains almoſt entire. But there is ſome reaſon to ſuſpect, that the ſingle particles of a menſtruum act like mechanical inſtruments, by the properties of their own proper ſize, figure, hardneſs, and gravity. Every menſtruum, while it diſſolves, is neceſſarily divided into inviſible particles, and muſt therefore be fluid in the action; and when the diſſolution is completed, the ſolvent and ſolvend muſt become one fluid.

Cuſtom has given the name of menſtruums to many bodies of a hard and conſiſtent nature, though in that ſtate they cannot act as ſolvents; and hence the chemiſts have divided menſtruums into ſolid and fluid.

Dry or ſolid menſtruums may be again divided into five claſſes, which, according to Boerhaave, are as follow: 1. The ſix metals, gold, lead, ſilver, copper, iron, and tin, which act upon one another after being fuſed in the fire, and may be intimately mixed, ſo as to make an apparently homogeneous maſs, every particle of which holds the ſame proportion of a different metal as the whole: for if ten ounces of ſilver be thus mixed with an ounce of gold, and a grain of this maſs be given to an aſſay-maſter, he will diſcover that it contains one eleventh part gold, and ten parts ſilver. 2. The ſemi-metals, as antimony, biſmuth, cinnabar, marcaſites, and zinc, which, when melted, mix with one another or with metals; but when thus mixed they are no longer malleable, but may eaſily be reduced to powder. 3. The dry ſalts, as alum, borax, nitre, ſal-ammoniac, ſea-ſalt, vitriol, fixed alkali, and murcury ſublimate, which may be ſubtilly divided by fire, and intimately mix with one another, with metals, ſemi-metals, and other things. 4. Hard foſſile ſulphureous bodies, as ſulphur vivum, common brimſtone, arſenic, orpiment and cobalt. 5. The foſſile bodies, called by refiners cements, which conſiſt of ſalts, ſulphur, and brick, reduced to dry powders, and ſtrewed betwixt plates of metals, in order to raiſe their colour, or ſeparate one metal from another.

Some menſtruums being left to themſelves, after olution concrete into a hard maſs, which, though compounded, appears of an uniform ſimple nature. In this manner, if melted lead be mixed with tin, they unite, as water with water, or mercury with mercury. The caſe is the ſame in all the metals, and in ſome of the ſemi-metals. Thus if a ſcruple of regulus of antimony be added to a pound of melted tin, the maſs when cold will appear uniform, but become entirely brittle; ſo fixed alkali unites with ſand in the fire; and ſulphur and mercury, by being ground together, turn to a black and dry powder, which being ſublimed, produces an apparent ſimple body, called cinnabar. Many become an hard, and ſometimes a dry body. Thus almoſt all the menſtruums of metals unite with their reſpective metals into ſolid vitriols; and thus ſtrong diſtilled vinegar, when it has diſſolved ſhells, chalk, and ſtony ſubſtances, ſeparates from its water, and together with the body it diſſolves, forms a dry hard maſs.

Numerous menſtruums have a liquid form before they act as ſolvents; as vinegar, water, ſaline, acid, alkaline, and compounded ſpirits, alkaline oils per deliquium, &c. Some menſtruums become liquid after the ſolution, and continue ſo with the ſolvent. Thus in the diſſolution of five of the metals with ſimple mercury, a ſoft paſte is produced, which may indefinitely be diluted by the addition of more mercury; but there is ſcarcely any known method of reſtoring this amalgama to its ſolidity. All the liquid menſtruums, after having diſſolved metals in a large proportion, cannot eaſily be dried; whence many have imagined theſe ſolutions to be fixed metallic oils, and have in vain ſought ſecrets in them.

It is now eaſy to obſerve that many menſtruums unite bodies as well as ſeparate them; for frequently after the diſſolution, the particles of the menſtruum preſently join with thoſe of the ſolvent, and produce a new compound, often very different from the nature of the ſimple reſolved body. The parts however of the ſolvent, after its concretion, no longer touch one another, but are ſeparated by the interpoſition of the particles of the matter diſſolved; and the particles which before conſtituted the ſolvend, are ſeparated by the interpoſition of the particles of the ſolvend. Hence it is plain that the parts of the menſtruums apply themſelves to the parts of the ſolvend; and a certain cauſe is here required to make the particles of the ſolvent fly from one another and approach the particles of the ſolvend, rather than remain in their former ſituation. The like cauſe ſeems to be required to make the particles of the ſolvend, now ſeparated, remain united with the parts of the menſtruum, rather than ſuffer the diſſolving and diſſolved particles to unite by their natural affinity into homogeneous bodies. This cauſe muſt be ſought in the ſolvend as well as in the ſolvent, for the action is reciprocal. Thus while aqua regia diſſolves thrice its weight of gold into a yellow liquor, the particles of gold are united with the aqua regia, and remain ſuſpended in it, though gold be eighteen times heavier than aqua regia. Whence there muſt be a mutual correſponding power between the particles of the gold and aqua regia, whereby they act upon, embrace and detain each other, otherwiſe the particles of gold would fall to the bottom, the ſaline particles reſt upon them, and the water float over both. If we were to deduce the cauſe from ſimilitude of ſubſtance, the action of diſſolution ſeems to be performed by a certain power of the parts of the menſtruum to attract the diſſolved parts rather than to repel them; and is not a mechanical action, or unfriendly commotion, but rather an appetite of union. Thus, in a violent ſolution, the agitation, heat, hiſſing and tumult ceaſe when all the parts of the ſolvend have united with thoſe of the ſolvent, as appears in throwing a piece of iron into weak aqua-fortis.

The whole ſolvent never acts at once upon the whole ſolvend, only thoſe particles of the ſolvent which touch ſome others of the ſolvend act firſt; and theſe being ſeparated, freſh particles of the menſtruum apply themſelves to others of the ſolvend: therefore part of the menſtruum acts upon that part of the body which it ſtrikes off and ſeparates; but the conflict made in this ſeparation excites a greater motion in the menſtruum, by which means other parts of the menſtruums are agitated and applied to other parts of the ſolvend.

Fire excites, promotes, and increaſes the action of menſtruums; for in extreme cold, ſolutions are either not made, or made but ſlowly, but they are ſoon performed by the aſſiſtance of heat: ſome menſtruums require a ſtrong heat, as mercury, before it will diſſolve metals: ſome a ſmaller; thus ſal ammoniac, ſea ſalt, and ſalt of tartar, eaſily diſſolve in water; ſome menſtruums act with a moderate heat, but loſe their diſſolving power, or even acquire a power of coagulating, by a ſtronger; thus warm water diſſolves the whites of eggs, which boiling coagulates. This effect of fire ſeems to be produced, 1. By impelling, moving, and agitating the menſtruum in the manner of a mere mechanical motion. 2. By its general power of expanding the ſubſtance of all bodies. 3. By ſeparating the parts ſo as ſet them farther aſunder. In moſt caſes the heat is increaſed during the ſolution, and even the action of thoſe menſtruums is augmented by heat, which degenerate a great degree of cold in the ſolution; thus ſal ammoniac diſſolves ſooneſt in warm water.

Sir Iſaac Newton accounts for the action of menſtruums, from the acids wherewith they are impregnated, which are found to be endued with a ſtrong attractive force, wherein their activity conſiſts. See Acid.

Menstruum, in pharmacy, chiefly denotes a body that will extract the virtues of ingredients by fuſion, decoction, &c.

Menstruum *Peracutum*, a menſtruum which Mr. Boyle extracted from bread only, that would prey even on glaſs, and perform many things which aqua-fortis would not.

With this he drew tinctures from coral, lapis hæmatites, granates, diamonds, and rubies.

Univerſal Menstruum. See Alkahest.

MENSURATION, *Menſuratio*, in general, denotes the act or art of meaſuring lines, ſuperficies, or ſolids.

MENTHA, mint, in botany. See the article Mint.

MENTZELIA, in botany, a genus of plants, whoſe flower conſiſts of five patent petals, with many ſetaceous erect ſtamina: the fruit is a long cylindraceous capſule, with one cell, containing many ſmall ſeeds.

MERCATOR's Chart, a projection of the earth's ſuperficies in plano, where the meridians are ſtraight lines, parallel to, and equidiſtant from, each other. The parallels of latitude are alſo ſtraight lines, and parallel to one another, but the diſtance between them increaſes from the equinoctial towards either pole, in the ratio of the ſecant of the latitude to the radius. See *Mercator's* Sailing.

MERCHANT, a perſon who buys and ſells commodities in groſs, or deals in exchanges; or that traffics in the way of commerce, either by importation or exportation. Formerly, every one that was a buyer or ſeller in the retail way, was called a merchant, as they ſtill are both in France and Holland; but here, ſhop-keepers, or thoſe who attend fairs or markets, have loſt that appellation.

MERCURIAL, ſomething conſiſting of, or relating to, mercury.

MERCURIFICATION, in chemiſtry, the method of ſeparating the mercuries of metals, which is moſt eaſily effected by means of a burning-glaſs; for the metal being placed in its focus, its mercurial parts are ſaid to fly off in ſmoke, which when condenſed and collected, appears to be true quickſilver.

MERCURY, in natural hiſtory, a fluid metallic ſubſtance, not moiſtening the hands; perfectly opake; of a bright ſilver colour, reſembling lead or tin when melted; entirely void of taſte and ſmell; extremely diviſible; not congealable in the greateſt degree of natural cold.

It is the moſt ponderous of all fluids, and of all known bodies except gold and platina; its gravity is to that of water nearly as 14 to 1; a cubic foot of quickſilver weighing 947 pounds, whilſt a cubic foot of water weighs but 70: it is found to be heavier in winter than in ſummer, in the proportion of eleven ounces thirty-two grains, to eleven ounces ſeven grains. In conſequence of its great denſity, it is of all fluids the coldeſt to the touch: the hand cannot be kept one quarter of an hour in a quantity of quickſilver with ſafety. Of all fluids likewiſe it grows the hotteſt, not really, but apparently, from the application of an equal external heat.

In a heat below ignition, it totally exhales in extremely thin, ſubtile, penetrating fumes, which condenſe into running mercury again: the admiſſion of air, which changes the fumes of the other ſemimetals into a powdery calx, has not that effect upon thoſe of quickſilver.

It diſſolves in all the mineral acids, but with different degrees of facility; and proves itſelf a menſtruum for ſundry metallic bodies. It has the greateſt affinity with gold; adhering to, and diſſolving that metal the moſt readily of all. It unites eaſily alſo with ſilver; leſs eaſily with lead; ſtill leſs ſo with tin; very difficultly with copper; moſt difficultly of all with iron, to which it ſeems to have an inſuperable repugnance. It does not eaſily take up biſmuth or regulus of antimony, unleſs they are previouſly mingled with other metals, or diſpoſed to unite with it by particular managements; after it has been combined with either of theſe, it throws them out again upon digeſtion; biſmuth, nevertheleſs, diſpoſes ſome other metals, particularly lead, to ſuch an intimate union with mercury, as to paſs along with it through the pores of leather. Quickſilver mingles alſo with various ſaline ſubſtances, and with ſulphur; with which laſt it forms a black maſs called æthiops, which changes, on ſublimation, into a red one called cinnabar.

There are different methods of purifying quickſilver; as ſtraining through leather; trituration or ablution with vinegar; with vinegar and ſalt, with ſope-leys, with rectified ſpirit of wine, and with aqua-fortis; and diſtillation, either without addition, or with alkaline ſalts, quick-lime, or iron filings. When quickſilver is only ſuperficially mixed with duſt or earthy powders, ſtraining thro' leather is ſufficient for its purification; if any foulneſs ſtill remains, ſpirit of wine will waſh it off: unctuous or oily impurities require ablution with ſope-leys. Lead and biſmuth are moſt effectually ſeparated by making the mercury into an æthiops, with a ſufficient quantity of ſulphur, and reviving it again from the æthiops by diſtillation, with twice its quantity of quick-lime, alkaline ſalt, or iron filings; the mercury alone will diſtil, and leave all its impurities behind; ſulphureous, antimonial, and other like admixtures, are to be ſeparated by the ſame means. The purification by aqua-fortis is performed by taking only a ſmall quantity of the acid to a large one of mercury; grinding them diligently together, and then waſhing the quickſilver with water. When mercury is combined with ſulphur into cinnabar, the revivification of it does not well ſucceed with alkaline ſalts; by fixed alkalies, the ſulphur is very difficultly, and not perfectly abſorbed; to volatile alkalies it does not yield at all: on the other hand it is obſervable, that metallic bodies, as iron, lead, tin, regulus of antimony, readily detain the ſulphur in diſtillation, and ſuffer the mercury to ariſe pure.

The largeſt quantities of mercury are employed for metallurgical operations: gold and ſilver are extracted, in the Spaniſh Weſt-Indies, from their ores or matrices, by amalgamation with mercury; and both metals are recovered by the ſame means, when blended in minute particles with earthy matters, as filing or working them. Amalgamated with tin, it makes the foil for looking-glaſſes, and reflecting balls. It is uſed alſo for gilding on ſilver, for anatomical injections, for weather-glaſſes, and ſundry other purpoſes. In vacuo, it appears luminous, and is then called the mercurial phoſphorus.

Quickſilver, conſidered as a medicine, is a ſpecific againſt the venereal diſeaſe, worms, lice, and all kinds of inſects: the venereal diſtemper is not perhaps to be radically cured without it; but againſt inſects there are other remedies equally if not more effectual. It is commonly ſuppoſed to have, of itſelf, no poiſonous quality; but it appears by experience, manifeſtly prejudicial to the nerves and the bones. Its ill effects are moſt obſervable in thoſe who are expoſed to its fumes; which fumes are no other than perfect quickſilver, as any one may be convinced by receiving them on a piece of moiſt leather or cloth, upon which they will reunite into little globules of mercury. Moſt people admit a pernicious quality in the fumes, though they deny it to the quickſilver; not conſidering that the fumes are only the quickſilver itſelf, divided but not altered by the heat. Even mercurial ointments applied externally have occaſioned contractions of the limbs, corroſions of the bones, and other dangerous conſequences. How ſoon do the miners feel its effects, though they neither anoint with it, nor ſwallow it, nor are expoſed to the fumes into which it is reſolved by fire! They firſt become paralytic, and fall afterwards into a ſalivation: their teeth drop out: violent pains in the whole body, particularly in the bones, and at length death, ſucceed. It may be proper to obſerve, that the Spaniſh phyſicians treat theſe patients in a different method from that purſued among us and in other countries: they expoſe them frequently for a conſiderable length of time to the open air, and give internally nothing but abſorbents.

Quickſilver, included in a flat-bottomed glaſs, having a ſmall hole open to the air, and kept for ſeveral months in a conſtant heat juſt not ſtrong enough to make it evaporate, calcines by degrees into a red powder, called mercurius calcinatus. A greater heat, ſufficient to make the mercury diſtil, does not only promote the calcination, but revives ſuch part as has been already calcined, into running mercury again. A weaker heat, as that of the human body, or even of boiling water, though continued for years, changes only a ſmall part of the mercury into a blackiſh powder: conſtant triture or agitation produces ſimilar effects to this low degree of heat, and in a much ſhorter time. If the free acceſs of air ſhould be found to influence the calcination of this, as it does that of the metallic bodies called imperfect, the tedious proceſs might be expedited, by uſing, for the veſſel, a glaſs tube, with both its ends bent upwards, and one of them conſiderably higher than the other; through which, a conſtant ſtream of freſh air would paſs over the ſurface of the ſmall thread of mercury at the bottom.

This red powder has by ſome been greatly eſteemed in venereal caſes, and ſuppoſed to be the moſt effectual and certain of the mercurials. It is accompanied with one conſiderable inconvenience, being greatly diſpoſed to irritate the firſt paſſages, and occaſion gripes; to prevent which, a ſmall quantity of opium, and ſome warm aromatic material, are commonly joined to it: the antivenereal pills of a late celebrated empyric are ſuppoſed to have been a compoſition of this kind. Even when thus corrected, however, it does not appear to have any advantage above the mercurials in common uſe and of eaſier preparation. The doſe is from half a grain to two grains: five or ſix grains are ſaid to vomit and purge violently.

The blackiſh powder, obtained by long agitation, is the baſis of an antivenerial medicine, which has lately come into great repute abroad; but which appears, from the accounts publiſhed of it in France, to be neither ſo ſafe, nor ſo effectual, as ſome of the common officinal mercurials.

If oil of vitriol be poured on half, or equal, its weight of quickſilver, and gradually heated till the liquor boils and diſtils; the more phlegmatic parts ariſe, while the ſtronger acid corrodes the mercury into a white cauſtic maſs. On the affuſion of warm water, the maſs falls into powder, and becomes immediately yellow; a part of it, ſatiated with acid, diſſolving in the water: the larger the quantity of acid made uſe of, and the leſs thoroughly the matter has been exſiccated or calcined, the more of it will diſſolve. The yellow powder, ground with freſh quantities of water till all the ſoluble part is extracted, becomes inſipid, and in this ſtate, commonly called turpeth or turbith mineral, it proves, though not corroſive, ſtrongly emetic; operating, in this intention, the moſt effectually of all the mercurials that can be given with ſafety. It is uſed chiefly in violent gonorrhœas, and other venereal caſes accompanied with a great flux of humours to the parts: it is ſaid likewiſe to have been employed with ſucceſs, in robuſt conſtitutions, againſt leprous diſorders, and obſtinate glandular obſtructions. The doſe, as an emetic, is from two grains to ſix or eight; though ſome conſtitutions, habituated to mercurials, can bear larger quantities. It may be given in ſmaller doſes, as half a grain or a grain, as an alterative, after the ſame manner as the red calx of mercury already mentioned: and even when intended as an evacuant, it may perhaps, as Malouin obſerves, be moſt adviſeable to give only a ſmall quantity at a time, as one grain, and repeat this doſe every hour till the vomiting ſucceeds.

On adding a ſolution of ſea-ſalt to a ſolution of mercury made in aqua-fortis, the nitrous acid quits the mercury, and unites with the alkaline baſis of the ſea-ſalt; and at the ſame time, the acid of the ſea-ſalt unites with the mercury, and forms with it a compound, difficultly, and only partially diſſoluble, of which therefore great part ſubſides, on ſtanding for ſome time, in form of a white powder. This powder, waſhed with freſh quantities of hot water, till the more ſoluble parts are extracted, becomes nearly inſipid. In this ſtate it is recommended by Boerhaave as one of the beſt of the mercurials, and ſaid, in doſes of three grains, to purge and vomit gently. It appears, however, too corroſive for internal uſe; being ſo much ſo, as to be employed by the farriers for the purpoſes of an eſcharotic. The preparation is likewiſe a very unfrugal one, a conſiderable part of the mercury remaining unprecipitated, and a conſiderable part of the precipitate being diſſolved and carried off in the ablution.

Spirit of ſal ammoniac, or other volatile alkalies, dropped into a filtered ſolution of ſublimate, abſorb a part of the acid; and the mercury, retaining ſo little as to be indiſſoluble, renders the liquor milky, and ſubſides on ſtanding, in form of a fine white powder, which, waſhed by repeated affuſions of hot water, becomes inſipid. Solutions of fixed alkaline ſalts, ſubſtituted to the volatile ſpirit, produce a yellow precipitation; but if an equal weight of crude ſal ammoniac be diſſolved along with the ſublimate, fixed alkalies, added to this ſolution, extricate the volatile alkali of the ſal ammoniac, and the precipitate proves the ſame as if the volatile alkali alone had been added in its pure ſtate. Theſe precipitates are uſed chiefly on account of the elegance of their colour, in unguents for cutaneous eruptions; one part of the mercurial precipitate, three of precipitate ſulphur, and eighteen of the ſimple ointment or pomatum, moiſtened with a little ſtrong alkaline ley, make the common mercurial application for theſe complaints. The precipitates have been given internally; but mercurius dulcis, which differs from them only in being more mild, and more equal and certain in its effects, is in this intention greatly to be preferred. It does not appear that a combination of mercury, with ſo ſmall a proportion of acid, that is, ſo mild and ſafe a mercurial, can be obtained by any kind of precipitation, as by the proceſs by which mercurius dulcis is prepared.

Mercurius dulcis is ſublimate made mild, by combining with it ſo much freſh mercury, as is ſufficient to ſatiate the redundant acid. Four parts of powdered ſublimate are ground with three of quickſilver, an operation in which great caution is neceſſary, to avoid the lighter corroſive particles that fly off, till they are thoroughly incorporated; or, which is much more commodious, digeſted together in a gentle heat, by which the union will be performed as effectually. The mixture is then ſublimed in a glaſs matraſs or phial; the ſublimed maſs freed from the whitiſh acrid matter about the mouth of the veſſel, and from ſuch mercurial globules as may happen to appear diſtinct, then pulveriſed, and ſublimed again: in this manner the ſublimation is repeated ſix times, by which means the medicine becomes leſs liable to irritate the firſt paſſages, and run off by ſtool.

Mercurius dulcis ſeems to be the beſt and ſafeſt of the mercurial preparations that can be taken in a ſolid form. It may be given from fifteen to twenty-five grains; or, as an alterative, from one to two or three grains.

Mercury, ☿, in aſtronomy, the ſmalleſt of the planets, and the neareſt the ſun. See the article Copernican.

Its mean diſtance from the ſun is 387 of ſuch parts of which the earth is 1000, its excentricity is 80 of ſuch parts. The inclination of its orbit is 6° 54′; it performs its revolution round the ſun in 87 days, 23 hours, 16′; its greateſt elongation is about 22° 46′. The place in the ecliptic for the aſcending node is in 14° 42′ of taurus. Its diameter to that of the earth is as 3 to 4; and therefore the globe of mercury will be to that of the earth as 2 to 5.

Mercury, in the ſame manner as venus, always keeps himſelf in the neighbourhood of the ſun, and never recedes from him ſo far as venus does; he hides himſelf ſo much in the ſplendor of the ſun's rays, that he is but ſeldom ſeen by us on the earth: but ſince the invention of teleſcopes, he has been frequently obſerved when in conjunction with the ſun, and to paſs under his diſk like a black ſpot. The exceeding brightneſs by which mercury outſhines all the planets, does evidently prove him to be much nearer the ſun than any of the reſt; for the nearer any body is to the ſun, the greateſt illuſtration it receives from him. From all this, it is evident, that mercury does likewiſe go round the ſun in a leſſer orbit, included within the orbit of venus. See the article Venus.

Mercury, in heraldry, a term uſed, in blazoning by planets, for the purple colour, in the arms of ſovereign princes. See the article Blazoning.

MERIDIAN, in aſtronomy, a great circle paſſing through the poles of the world, and both the zenith and nadir, croſſeth the equinoctial at right-angles, and divideth the ſphere into two hemiſpheres, the eaſtern and weſtern: it has its poles in the eaſt and weſt points of the horizon. It is called meridian, becauſe when the ſun cometh to the ſouth part of this circle, it is then mid-day; and then the ſun has his greateſt altitude for that day. Theſe meridians are various, and change according to the longitudes of places; ſo that they may be ſaid to be infinite in number, for all places from eaſt to weſt have their ſeveral meridians: but there is (or ſhould be) one fixed, which is called the firſt meridian. Ptolemy choſe to make that the firſt meridian which paſſes near the Fortunate iſlands, at about the diſtance of one degree from them; and reckons from thence to the eaſt through Africa and Aſia; chooſing to begin at a place inhabited, and which was then the bounds and limits of the known part of the earth to the weſt, and to end at the eaſtern ſhore of Scain in Aſia.

But our geographers and map-makers frequently aſſume the meridian of the place, or the capital of the country, for the firſt meridian; and thence reckon the longitudes of their places.

Meridian *Line*, on a dial, is a right-line ariſing from the interſection of the meridian of the place, with the plane of the dial: this is the line of twelve o'clock, and from hence the diviſion of the hour-lines begins. See Dial.

Magnetical Meridian, is a great circle paſſing through the magnetical poles, to which the magnetic needle, or needle of the mariner's compaſs, conforms itſelf.

Meridian *Altitude of the Sun or Stars*, is their altitude when in the meridian of the place where they are obſerved. Or it may be defined, an arch of the great circle perpendicular to the horizon, and comprehended between the horizon and the ſun or ſtar, then in the meridian of the place.

MERIDIONAL Distance, in navigation, is the ſame with the departure, eaſting or weſting, or the difference of longitude between the meridian under which the ſhip now is, and any other meridian ſhe was before under.

Meridional *Parts*, *Miles*, or *Minutes*, in navigation, are the parts by which the meridians in Mr. Wright's Chart (commonly, though falſely, called Mercator's) do increaſe as the parallels of latitude decreaſe: and as the coſine of the latitude of any place, is equal to the radius or ſemi-diameter of that parallel; therefore, in the true ſea-chart, or nautical planiſphere, this radius being the radius of the equinoctial, or whole ſine of 90°, the meridional parts at each degree of latitude muſt increaſe, as the ſecants of the arch, contained between that latitude and the equinoctial, do decreaſe. The tables, therefore, of meridional parts, which we have in books of navigation, are made by a continual addition of ſecants; they are calculated in ſome books for every degree and minute of latitude; and they will ſerve either to make or graduate a Mercator's Chart, or to work the Mercator's Sailing.

MERLON, in fortification, is that part of a parapet which is terminated by two embraſſures of a battery. Its height and thickneſs is the ſame with that of the parapet; but its breadth is generally nine feet on the inſide, and ſix on the outſide. It ſerves to cover thoſe on the battery from the enemy; and is better when made of earth well beat and cloſe, than when built with ſtone; becauſe theſe fly about and wound thoſe they ſhould defend.

MERLUCIUS, in ichthyology, a fiſh called in Engliſh the hake. See HAKE.

MERMAID, or MERMAN, an imaginary animal, ſuppoſed to be half human and half fiſh; which probably took its riſe from an imperfect view of the thrichechus. See THRICHECHUS.

MEROPS, the BEE-EATER, in ornithology, the blue-breaſted iſpida, with a variegated head; a very beautiful bird, ſomewhat larger than the common king-fiſher. See ISPIDA.

MERULA, the BLACKBIRD, in ornithology, a ſpecies of the turdus or thruſh-kind. See the article TURDUS.

MESEMBRYANTHEMUM, fig-marigold, in botany, a genus of plants, whoſe flower is monopetalous and cut into many ſpear-ſhaped linear ſegments, and ranged in ſeveral ſeries: the ſtamina are compoſed of a great number of capillary filaments, terminated by incumbent antheræ: the fruit is a roundiſh fleſhy capſule, having ſeveral cells, which are filled with ſmall roundiſh ſeed.

There are great varieties of this genus, moſt of which are natives of the Cape of Good-Hope; and are preſerved in our green-houſes, either for the beauty of the flowers of ſome ſpecies, or the agreeable variety of the foliage of others: they are moſt of them perennial plants, and are eaſily raiſed from cuttings in the ſummer months.

This genus comprehends the ficoides of Tournefort.

MESENTERY, in anatomy, a thick fat membrane, placed in the midſt of the inteſtines, particularly of the ſmaller ones, whence it has the name. Its ſubſtance is compoſed of membranes, fat, veſſels of all kinds, and in the human body of a number of glands. In the upper part, it is connected with the three ſuperior vertebræ of the loins; and in the lower, with the inteſtines, and particularly with the jejunum and ileum; to which it alſo gives their outer coat. When it is ſeparated from the inteſtines, it has ſeveral folds reſembling gloves. Its length, in the whole, is about three ells, but the inteſtines which are joined to it, are at leaſt four times that length. Its coats or membranes are two, and between theſe there is a cellular ſubſtance which contains the fat: the meſeraic veſſels and glands are alſo placed there, which many reckon a third coat of the meſentery, and that not improperly; this they call the tunica celluloſa.

The veſſels of the meſentery are blood-veſſels, nerves, lacteals, and lymphatics. The blood-veſſels are the ſame with thoſe of the inteſtines, and theſe make a multitude of ſtrange meanders, and have very frequent anaſtomoſes. The nerves alſo come from the par vagum, and the intercoſtals.

MESNE, in law, ſignifies him who is lord of a manor, and who hath tenants holding of him, yet himſelf holding of a ſuperior lord. This word alſo ſignifies a writ, which lies where there is a lord-meſne and tenant, and the tenant is diſtrained for ſervices due from the meſne to the ſuperior lord.

MESCOLON, in anatomy, that part of the meſentery connected with the great guts, eſpecially the colon. See the article MESENTERY.

The meſocolon meets the midſt of the colon, to which it is joined. Its lower part ſticks to a part of the rectum.

MESOLABE, an inſtrument uſed by the antients for finding two mean proportionals mechanically, which they could not effect geometrically.

It conſiſted of three parallelograms, moving in a groove to certain interſections.

MESOLOGARITHMS, according to Keplar, are the logarithms of the co-ſines and co-tangents, the former of which were called by lord Napier antilogarithms, and the latter differentials.

They are otherwiſe called artificial ſines and tangents. See the articles LOGARITHM, SINE, TANGENT, &c.

MESPILUS, the medlar, in botany, a genus of plants, whoſe flower conſiſts of five roundiſh concave petals inſerted in the cup; the ſtamina are from ten to twenty ſubulated filaments, topped with ſingle antheræ. The fruit is a globoſe umbilicated berry, carrying the cup on its top; and contains five oſſeous and gibbous ſeeds. This genus includes the ſeveral ſpecies of hawthorns, the glaſtenbury thorn, and pyracantha. The fruit of the common medlar is very grateful, though not eatable till it is rotten.

MESSIAH, the anointed; a title which the Jews gave to their expected great deliverer, whoſe coming they ſtill wait for; and a name the Chriſtians apply to Jeſus Chriſt, in whom the prophecies relating to the Meſſiah were accompliſhed. Among the Jews, anointing was the ceremony of conſecrating perſons to the higheſt offices and dignities; kings, prieſts, and ſometimes prophets, were anointed: thus Aaron and his ſon received the ſacerdotal, Eliſha the prophetic, and David, Solomon, and others, the royal unction.

METACARPUS, in anatomy, that part of the hand between the wriſt and the fingers.

METACARPUS, ſignifies alſo a ſmall, very fleſhy muſcle, ſituated obliquely between the large internal annular or tranſverſe ligament of the carpus, and the whole inſide of the fourth metacarpal bone.

METAGITNION, *μεταγειτνιων*, in chronology, the ſecond month of the Athenian year, containing twenty-nine days, and anſwering to the latter part of our July, and beginning of Auguſt.

METALS, *metalla*, in natural hiſtory, are defined to be foſſile bodies, fuſible by fire, concreting again in the cold, and malleable, or diſtenſible and ductile under the hammer. Theſe are the diſtinguiſhing characters of theſe bodies in their pure ſtate: but many of them are not found in this pure ſtate in the earth, being reduced by admixtures of ſulphur and other bodies to the ſtate of ore. See ORE. The claſs of the metals, according to theſe characters, include ſix bodies, viz. gold, ſilver, copper, tin, iron, and lead. For the properties, preparations, uſes, and peculiar characters, &c. of each, ſee the articles GOLD, SILVER, &c.

Prince's METAL, called alſo *Bath*-METAL, a kind of factitious metal, of a beautiful yellow, and diſpoſed to receive a fine poliſh, luſtre, &c. It is prepared, according to Dr. Shaw, as follows: take ſix ounces of copper, melting it in a wind-furnace; add to it one ounce of zink: then ſtirring the whole well together, pour out the metal immediately. The copper and zink may be put into the crucible together, if firſt covered over with the black flux, which prevents the evolution of the zink, or preſerves its metalline form. See the article FLUX.

Semi-METALS, metallic foſſils, fuſible by fire, and not malleable in their pureſt ſtate.

Theſe are all, in their native ſtate, penetrated by, and intimately mixed with ſulphur, and other adventitious matter, and reduced to what are called ores.

Of this ſeries of foſſils there are only five bodies, all naturally comprehended in the ſame claſs, but each making a ſeparate and diſtinct genus: theſe are antimony, biſmuth, cobalt, zink, and quickſilver. For the characters, preparations, and uſes of each, ſee ANTIMONY, BISMUTH, COBALT, ZINK, and MERCURY.

METAL, in heraldry. There are two metals uſed in heraldry, by way of colours, viz. gold and ſilver, in blazon called *or* and *argent*.

In the common painting of arms theſe metals are repreſented by white and yellow, which are the natural colours of thoſe metals. In engraving, gold is expreſſed by dotting the coat, &c. all over; and and ſilver, by leaving it quite blank.

It is a general rule in heraldry, never to place metal upon metal, nor colour upon colour; ſo that if the field be of one of the metals, the bearing muſt be of ſome colour; and if the field be of any colour, the bearing muſt be of one of the metals.

METALLIC, or METALLINE, an adjective applied to ſomething that bears a relation to metals. See METAL.

METALLURGY, *metallurgia*, according to Boerhaave, comprehends the whole art of preparing and working metals, from the glebe, or ore, to the utenſil; in which ſenſe, aſſaying, ſmelting, refining, ſmithery, gilding, &c. are only branches of metallurgy.

METAMORPHOSIS, in general, denotes the changing of ſomething into a different form; in which ſenſe it includes the transformation of inſects, as well as the mythological changes related by the antient poets.

Mythological metamorphoſes were held to be of two kinds, apparent and real: thus that of Jupiter into a bull, was only apparent; whereas that of Lycaon into a wolf, was ſuppoſed to be real.

Moſt of the ancient metamorphoſes include ſome allegorical meaning, relating either to phyſics or morality: ſome authors are even of opinion that a great part of the ancient philoſophy is couched under them; and lord Bacon and Dr. Hook have attempted to unriddle ſeveral of them.

Ovid's Metamorphoſes make an excellent ſyſtem of morality: the ſtories of Deucalion and Pyrrha, of Phaëton, of Baucis and Philemon, of Minos and Scylla, &c. being excellent leſſons in this way.

METAPHOR, in rhetoric, a trope, by which we put a ſtrange word for a proper word, by reaſon of its reſemblance to it; or it may be defined, a ſimile or compariſon intended to inforce or illuſtrate the thing we ſpeak of, without the ſigns or forms of compariſon. Thus, if we ſay, *God is* a ſhield *to good men*, it is a metaphor, becauſe the ſign of compariſon is not expreſſed, though the reſemblance which is the foundation of the trope, is plain; for as a ſhield guards him that bears it, againſt the attacks of an enemy, ſo the providence and favour of God protects good men from malice and misfortunes: but if the ſentence be put thus, *God is* as a ſhield *to good men*, then it becomes a ſimile or compariſon.

METAPHRASE, uſually ſignifies ſomething more than either a tranſlation or a paraphraſe: according to Baillet, a metaphraſt implies a tranſlator, gloſſator, and interpolator altogether.

METAPHYSICS, *Metaphyſica Tranſnaturalis*, ontology, or ontoſophy, a ſcience that treats of being, as ſuch, in the abſtract.

METAPLASMUS, in grammar, a tranſmutation or change made in a word, by adding, retrenching, or altering a letter or ſyllable thereof.

The ſeveral ſpecies of this figure are ten in number, viz. proſthesis, epentheſis, paragogue, diæreſis, aphæreſis, ſyncope, apocope, craſis, metatheſis and antitheſis; four of which augment the letters or ſyllables of a word, four retrench them, and two alter them.

METASTASIS, in medicine, a tranſpoſition or ſettlement of ſome humour or diſeaſe, on ſome other part; and ſometimes it ſignifies ſuch an alteration of a diſeaſe, as is ſucceeded by a ſolution.

METATARSUS, in anatomy, a fleſhy maſs lying under the ſole of the foot.

METATHESIS, in grammar, a ſpecies of the metaplaſmus; being a figure whereby the letters or ſyllables of a word are tranſpoſed, or ſhifted out of their uſual ſituation, as piſtris for priſtis, lybia for libya, &c.

METEMPSYCHOSIS, the doctrine of tranſmigration, which ſuppoſes that human ſouls, upon their leaving the body, become the ſouls of ſuch kind of brutes as they moſt reſemble in their manners.

This was the doctrine of Pythagoras and his followers, who held that the ſouls of vicious men were impriſoned in the bodies of miſerable beaſts, there to do pennance for ſeveral ages, at the expiration whereof they returned again to animate men; but if they had lived virtuouſly, ſome happier brute, or even a human creature, was to be their lot. What led Pythagoras into this opinion was the perſuaſion he had that the ſoul was not of a periſhable nature; whence he concluded, that it muſt move into ſome other body upon its abandoning this. Lucan thinks this doctrine was contrived to mitigate the appehenſion of death, by perſuading men that they only changed their lodgings, and ceaſed to live only to begin a new life. Reuchlin denies this doctrine, and maintains, that the metempſychoſis of Pythagoras implied nothing more than a ſimilitude of manners and deſires formerly exiſting in ſome perſon deceaſed, and now reviving in another alive. Pythagoras is ſaid to have borrowed the notion of a metempſychoſis from the Egyptians; others ſay from the antient brachmans. It is ſtill retained among the antient Banians, and other idolaters of India and China, and makes the principal foundation of their religion. Many of the modern Jews are ſaid to eſpouſe this doctrine, and, to ſupport their opinion, quote theſe words of Job, "Lo all theſe things worketh God oftentimes with man (in Hebrew, *and thrice)* to bring back his ſoul from the pit to be enlightened with the light of the living." It is certain, that at the time of Jeſus Chriſt this opinion was very common among the Jews: this appears in the Goſpel, when they ſay that ſome thought Jeſus Chriſt to be John the Baptiſt, others Elias, others Jeremiah, &c.

METEMTOSIS, a term in chronology, expreſſing the ſolar equation, neceſſary to prevent the new moon from happening a day too late, by which it is oppoſed to proemptoſis, which ſignifies the lunar equation neceſſary to prevent the new moon from happening a day too ſoon.

METEOR, in phyſiology, an imperfect, changeable, and mixt body, or the reſemblance of a body appearing in the atmoſphere, and formed by the action of the heavenly bodies, out of the common elements.

METHOD, *μεθοδος*, in logic, &c. the arrangement of our ideas in ſuch a regular order, that their mutual connection and dependence may be readily comprehended. See IDEA and KNOWLEDGE.

METHODISTS, a name at firſt given to a ſociety of religious young men at Oxford, and now applied to all thoſe who adhere to the doctrine of the church of England as taught by Whitefield, Weſley, &c.

METHODISTS, *Methodici*, is alſo an appellation given a ſect of ancient phyſicians, who reduced the whole healing art to a few common principles or appearances.

METOCHE, in ancient architecture, a term uſed by Vitruvius to ſignify the ſpace or interval between the dentils.

METONIC CICLE, in chronology, the ſame with the cycle of the moon. See CYCLE.

METONYMY, in rhetoric, is a trope in which one name is put for another, on account of the near relation there is between them.

METOPE, *Metopa*, in architecture, is the interval or ſquare ſpace between the triglyphs of the Doric frieze, which, among the ancients, uſed to be painted or adorned with carved work, repreſenting the heads of oxen, or utenſils uſed in ſacrifices.

Semi-METOPE, in architecture, is a ſpace in the corner of the Doric frieze, ſomewhat leſs than half a metope.

METOPOSCOPY, the pretended art of knowing a perſons diſpoſitions and manners, by viewing the traces and lines in the face. See PHYSIOGNOMONICS.

METRE, *μετρια*, in poetry, a ſyſtem of feet of a juſt length. See NUMBERS.

METRETES, an ancient meaſure of capacity, containing a little more than nine gallons.

METRICAL, ſomething relating to metre.

METROPOLIS, the capital or principal city of a country or province.

MEUM, ſpignel, in botany. See SPIGNEL.

MEW, a place where a hawk is ſet, during the time ſhe raiſes her feathers.

MEWING, the falling off, or change of hair, feathers, ſkin, horns, or other parts of animals, which in ſome happens annually, in others only at certain ſtages of their lives: but the generality of beaſts mew in the ſpring.

MEZEREON, in botany, a ſhrub common in our gardens; the flowers come out very early in the ſpring, before the leaves appear, growing in cluſters all round the ſhoots of the former year; there are commonly three flowers produced from each knot or joint ſtanding on a ſhort foot-ſtalk: when the flowers are decayed, they are ſucceeded by ſmooth ſpear-ſhaped leaves, about two inches long, which are irregularly placed on the branches: the fruit is an oval berry, which ripens in June.

The mezereon is propagated by ſowing the ſeeds ſoon after they are ripe; and when the plants have remained two years in the ſeed bed, they may, in autumn, be tranſplanted into the nurſery, there to remain two years more, at which time they may be planted where they are intended to remain.

Although the birds are very fond of the berries of this plant, when they are ripe, yet they are ſo very acrid as to burn the mouths and throats of thoſe perſons who incautiouſly taſte them.

There are two ſorts of mezereon, one producing white flowers with yellow berries, and the other having pink coloured flowers with red berries.

For the generical characters of mezereon, ſee the article DAPHNE, of which it is held a ſpecies.

MEZZOTINTO, a particular manner of repreſenting figures on copper, ſo as to form prints in imitation of painting in Indian ink.

The manner of making mezzotintos is very different from all other kinds of engraving and etching, ſince inſtead of forming the figures with lines and ſcratches, made with the point of a graver, or by means of aqua-fortis, they are wholly formed by ſcraping and burniſhing.

Mezzotintos are made in the following manner: Take a well-poliſhed copper-plate, and beginning at the corner, rake or furrow the ſurface all over with a knife or inſtrument made for the purpoſe, firſt one way and then the other, till the whole is of a regular roughneſs, without the leaſt ſmooth part to be ſeen; in which ſtate, if a paper was to be worked off from it at the copper-plate preſs, it would be all over black. When this is done, the plate is rubbed over with charcoal, black-chalk, or black-lead, and then the deſign is drawn with white chalk; after which, the out-lines are traced out, and the plate finiſhed by ſcraping off the roughneſs, ſo as to leave the figure on the plate.

The out-lines and deepeſt ſhades are not ſcraped at all, the next ſhades are ſcraped but little, the next more, and ſo on, till the ſhades gradually falling off, leave the paper white, in which places the plate is neatly burniſhed.

By an artful diſpoſition of the ſhades, and different parts of a figure on different plates, mezzotintos have been printed in colours, ſo as nearly to repreſent very beautiful paintings.

MIASMA, among phyſicians, denotes the contagious effluvia of peſtilential diſeaſes, whereby they are communicated to people at a diſtance.

MICAH, or *the Book of* MICAH, a canonical book of the Old-Teſtament, written by the prophet Micah, who is the ſeventh of the twelve leſſer prophets. He is cited by Jeremiah, and propheſied in the days of Jotham, Ahaz, and Hezekiah. He cenſures the reigning vices of Jeruſalem and Samaria, and denounces the judgments of God againſt both kingdoms. He likewiſe foretels the confuſion of the enemies of the Jews, the coming of the Meſſiah, and the glorious ſucceſs of his church.

MICHAELMAS, or *Feaſt of St.* MICHAEL *and all Angels*, a feſtival of the Chriſtian church, obſerved on the twenty-ninth of September.

MICHELIA, in botany, a genus of plants, whoſe flower conſiſts of eighteen lanceolated petals, with many, very ſhort, ſubulated filaments, topped with erect pointed antheræ: the fruit is compoſed of a number of globoſe unilocular berries, each containing four ſeeds, convex on one ſide and angulated on the other.

MICROCOSM, μικροκοσμος, a Greek term, ſignifying the little world; uſed by ſome for a man, as being ſuppoſed an epitome of the univerſe, or great world.

MICROGRAPHY, μικρογραφια, the deſcription of objects, too minute to be viewed without the aſſiſtance of a microſcope. See the article MICROSCOPE.

MICROMETER, an aſtronomical machine, which, by means of a ſcrew, ſerves to meaſure extremely ſmall diſtances in the heavens, &c. and that to a great degree of accuracy.

The micrometer conſiſts of a graduated circle, (plate LXXI. *fig.* 1.) of a ſcrew *q o*, and its index *q r*. The threads of the ſcrew are ſuch, that 50 make the length of one inch exactly. When it is to be uſed, the point *o* is ſet to the ſide of the part to be meaſured, and then the index is turned about with the finger, till the eye perceives the point has juſt paſſed over the diameter of the part; then the number of turns, and parts of a turn, ſhewn by the graduated circle, will give the dimenſions in part of an inch, as we ſhall ſhew by the following example: Suppoſe it required to meaſure the diameter of an human hair, and I obſerve the index is turned juſt once round, while the point *o* paſſes over it. Then it is plain, the diameter of the hair in the image is $\frac{1}{50}$ of an inch. Now, if the microſcope I D E F *d e f*, magnifies 6 times, or makes the image 6 times larger in diameter than the object, then is the diameter of the hair itſelf but $\frac{1}{6}$ of $\frac{1}{50}$, that is, but $\frac{1}{300}$ part of an inch.

Alſo, it is to be obſerved, that as there are 10 large diviſions and 20 ſmall ones, on the micrometer-plate, ſo each of thoſe ſmall diviſions are the $\frac{1}{20}$ of $\frac{1}{50}$, or the $\frac{1}{1000}$ part of an inch. Therefore, if, in meaſuring any part of an object, you obſerve how many of theſe ſmaller diviſions are paſſed over by the index, you will have ſo many thouſandth parts of an inch for the meaſure required. All which is ſo plain, that nothing can be ſaid to illuſtrate the matter.

MICROPUS, baſtard cudweed, in botany, an annual plant, whoſe root ſends forth ſeveral trailing ſtalks, which are furniſhed with ſeveral ſmall oval leaves of a bright ſilvery colour, whoſe baſe embraces the ſtalk. The flowers are female and hermaphrodite, and come out in cluſters from the wings of the ſtalks. The female flowers have neither corolla nor pericarpium, but the ſeeds are included in the cup, which is immutable; the hermaphrodite flowers are monopetalous and infundibuliform, but are barren.

MICROSCOPE, an optical inſtrument, by means whereof, very minute objects are repreſented, exceedingly enlarged, and are viewed very diſtinctly, according to the laws of refraction or reflection. See REFRACTION and REFLECTION.

Microſcopes are either ſingle or double; a ſingle microſcope is only a very ſmall globule of glaſs, or a ſmall double convex glaſs, whoſe focal diſtance is very ſhort. A minute object pq (plate LXXI. *fig.* 2.) ſeen diſtinctly through a ſmall glaſs AE by the eye put cloſe to it, appears ſo much greater than it would to the naked eye, placed at the leaſt diſtance qL, from whence it appears ſufficiently diſtinct, as this latter diſtance qL is greater than the former qE. For having put your eye cloſe to the glaſs EA, in order to ſee as much of the object as poſſible at one view, remove the object pq to and fro, till it appears moſt diſtinctly, ſuppoſe at the diſtance Eq. Then conceiving the glaſs AE to be removed, and a thin plate, with a pin-hole in it, to be put in its place, (*fig.* 3.) the object will appear diſtinct, and as large as before, when ſeen through the glaſs, only not ſo bright. And in this latter caſe, it appears ſo much greater than it does to the naked eye, at the diſtance qL, either with the pin-hole or without it, as the angle pEq is greater than the angle pLq, or as the latter diſtance qL is greater than the former qE. Since the interpoſition of the glaſs has no other effect than to render the appearance diſtinct, by helping the eye to increaſe the refraction of the rays in each pencil, it is plain that the greater apparent magnitude is entirely owing to a nearer view than could be taken by the naked eye. If the eye be ſo perfect as to ſee diſtinctly by pencils of parallel rays falling upon it, the diſtance, Eq, of the object from the glaſs, is then the focal diſtance of the glaſs. Now if the glaſs be a ſmall round globule whoſe diameter is $\frac{1}{15}$ of an inch, its focal diſtance Eq being three quarters of its diameter, is $\frac{1}{20}$ of an inch; and if qL be eight inches, the uſual diſtance at which we view minute objects, this globule will magnify at the rate of 8 to $\frac{1}{20}$ or of 160 to 1.

In microſcopes made with ſingle lenſes, a given object placed at their principal focuſes will appear equally diſtinct, if their linear apertures be as their focal diſtances. And in microſcopical lenſes, whoſe focal diſtances are not much longer than half an inch, there is no need to contract their apertures, for procuring diſtinct viſion; the pupil itſelf being ſmall enough to exclude the exterior ſtraggling rays. But in ſmaller lenſes, where apertures are neceſſary, to preſerve the ſame degree of diſtinctneſs, their diameters muſt be as their focal diſtances; and then their apparent brightneſs will decreaſe in a duplicate ratio of their focal diſtances, ſo that by uſing ſmaller glaſſes the apparent magnitude and the obſcurity of the object will both increaſe in the ſame ratio.

A double microſcope is compoſed of two convex glaſſes placed at E and L (*fig.* 4.) The glaſs L next the object PQ is very ſmall, and very much convex, and conſequently its focal diſtance LF is very ſhort; the diſtance LQ of the ſmall object PQ, is but a little greater than LF; ſo that the image pq, may be formed at a great diſtance from the glaſs, and conſequently may be much greater than the object itſelf. This picture pq being viewed through a convex eye-glaſs AE, whoſe focal diſtance is qE, appears diſtinct. Now the object appears magnified upon two accounts; firſt, becauſe if we viewed its picture pq with the naked eye, it would appear as much greater than the object, at the ſame diſtance, as it really is greater than the object, or as much as Lq is greater than LQ; and ſecondly, becauſe this picture appears magnified through the eye-glaſs as much as the leaſt diſtance at which it can be ſeen diſtinctly with the naked eye, is greater than qE, the focal diſtance of the eye-glaſs. For example, if this latter ratio be 5 to 1, and the former ratio of Lq to LQ be 20 to 1, then upon both accounts the object will appear 5 times 20, or 100 times greater than to the naked eye.

To fit theſe microſcopes to ſhort-ſighted eyes, the glaſſes E and L muſt be placed a little nearer together; ſo that the rays of each pencil may not emerge parallel, but may fall diverging upon the eye; and then the apparent magnitude will be altered a little, but ſcarce ſenſibly.

The Solar or Camera Obſcura MICROSCOPE, depends on the ſun-ſhine, and muſt be made uſe of in a darkened chamber, as its name implies. This inſtrument conſiſts of ſeveral parts, viz. A (plate LXXI. *fig.* 5.) a ſquare frame of mahogany to be fixed to the ſhutter of a window, by means of the ſcrews 1, 1. To this frame is applied a circular collar of the ſame wood, with a groove on its perephery on the outſide, denoted by 2, 3. This collar is connected by a cat-gut to the pulley 4 on the upper part, which is turned round by the pin 9 within. On one part of the collar, on the outſide, is faſtened, by hinges, a looking-glaſs G, in a proper frame, to which is fixed the jointed wire 6, 7; by which means, and the ſcrew H 8, it may be made to ſtand in an angle more or leſs inclined to the frame. In the middle of the collar is fixed a tube of braſs C, near two inches in diameter; the end of which, on the outſide, has a convex lens 5 to collect the ſun-beams thrown on it by the glaſs G, and converging them towards a focus in the other part, where D is a tube ſliding in and out to adjuſt the object to a due diſtance from the focus. To the end G of another tube F, is ſcrewed one of Wilſon's

PLATE LXXI.

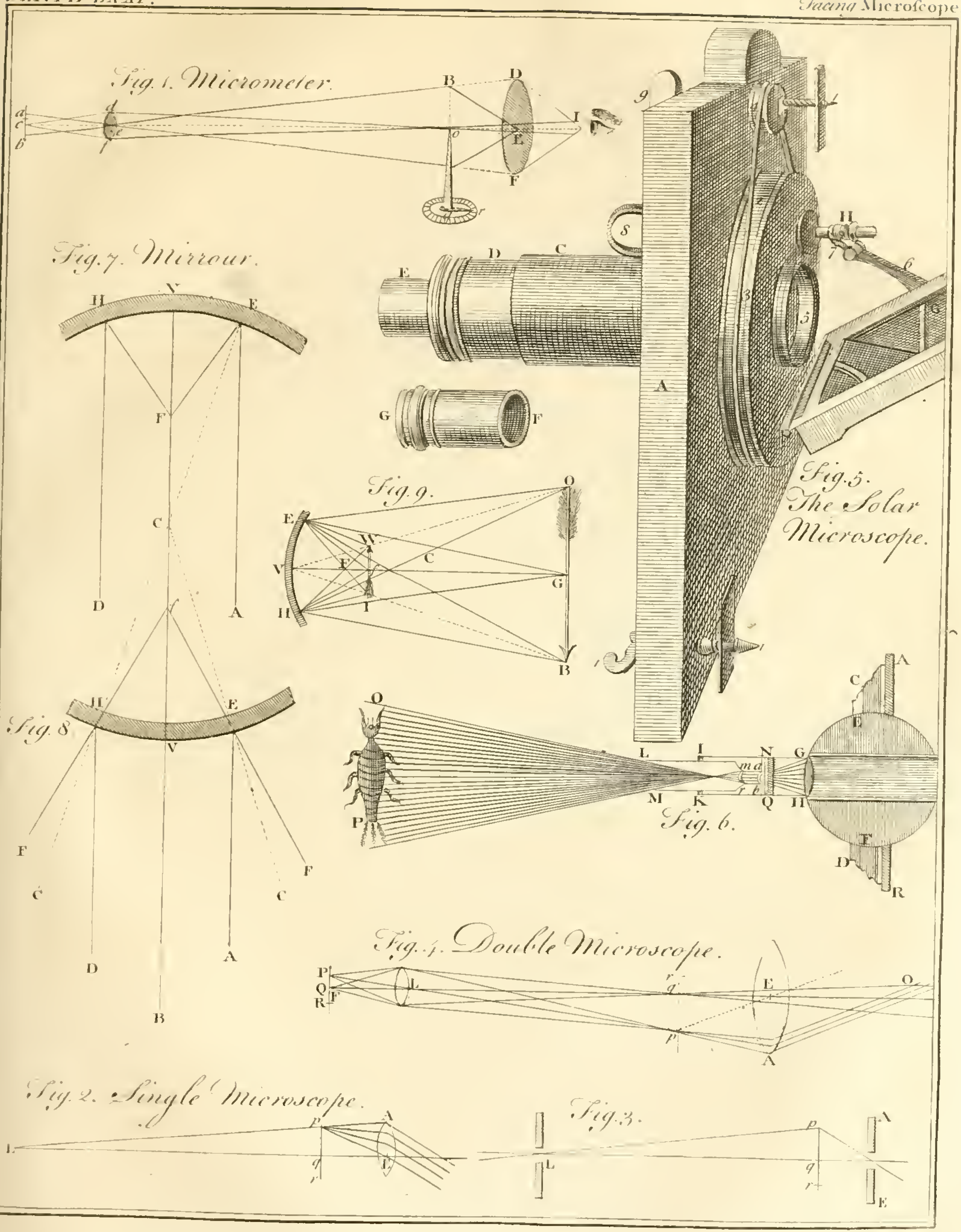


Fig. 1. Micrometer.
a c b d e f B D o E I F r
Fig. 7. Mirrour.
H V E F C D A
Fig. 8
H E V F C D B A f
Fig. 9.
O E W F C V G I H B
Fig. 5. The Solar Microscope.
A C D E G F H 1 2 3 5 6 7 8 9
Fig. 6.
O P L M I K N Q G H m a r b A C E F D R
Fig. 4. Double Microscope.
P Q R F L r q p E O A
Fig. 2. Single Microscope.
I p A q r L
Fig. 3.
L p q r A E

Wilſon's ſingle pocket-microſcopes, containing the object to be magnified in a ſlider; and by the tube F, ſliding on the ſmall end E of the tube D, it is brought to a due focal diſtance.

The ſun's rays being directed by the looking-glaſs through the tube upon the object, the image or picture of the object is thrown diſtinctly and beautifully upon a ſcreen of white paper, or a white linen ſheet, placed at ſome diſtance to receive the ſame; and may be magnified to a ſize beyond the imagination of thoſe who have not ſeen it. For the farther off the ſcreen is removed, the larger will the object appear, inſomuch that a louſe may be magnified to the length of five or ſix feet, or even a great deal more; but it is more diſtinct when not enlarged to above half that ſize.

This inſtrument has been contrived very commodiouſly in ſeveral different forms; but we ſhall here illuſtrate the following by a diagram. A R (*fig.* 6.) is a ſection of the window-ſhutter of a dark room, C D of the frame containing a ſcioptric ball E F; in the forepart whereof is ſcrewed the tube G I K H, at one end of which is a lens G H, which, by converging the ſun-beams into a narrow compaſs, does ſtrongly enlighten the ſmall object *a b*, placed on a ſlip of glaſs, or otherwiſe, in the part of the tube N Q; where a ſlit is made on each ſide for that purpoſe. Within this tube there ſlides another, L *m r* M, which contains a ſmall magnifying lens *m r*. By moving the exterior tube, I G H K, one way and the other, the glaſs G H will be brought to receive the rays of the ſun directly, and will therefore moſt intenſely illuminate the object *a b*. The other tube, L M, being ſlid backwards and forwards, will adjuſt the diſtance of the ſmaller lens *m r*, ſo that the image of the object *a b* ſhall be made very diſtinct, on the oppoſite ſide of the room at O P; and the magnitude of the image will be to that of the object, as its diſtance from the lens *m r* is to the diſtance of the object from it, as is evident from the figure.

Thus, for example, ſuppoſe the focal diſtance of the lens *mr* to be one inch $= r$, and let the diſtance at which it is placed from the object be 1, $1 = d$; then, if the lens be double and equally convex, as uſual, the diſtance of the image will be $\frac{dr}{d-r} = f =$ 110; therefore the image will be 110 times larger than the object in its linear dimenſions, and $110 \times 110 = 12100$ times larger in ſurface; and in ſolidity it will $110 \times 110 \times 110 = 1331000$ times larger than the object.

This is the moſt entertaining of any; and, perhaps, the moſt capable of making diſcoveries in objects that are too opake, as it ſhews them much larger than can be done any other way. Such too as have no ſkill in drawing, may, by this contrivance, eaſily ſketch out the exact figure of any object they have a mind to preſerve a picture of.

MID-HEAVEN, the point of the ecliptic that culminates, or in which it cuts the meridian.

MIGNONETTE, in botany, a ſpecies of the reſeda. See the article RESEDA.

MILIUM, millet, in botany. See the article MILLET.

MILDEW, *rubigo*, a diſeaſe happening to plants, cauſed by a dewy moiſture, ſuppoſed by ſome to be a ſpecies of blight. See the article BLIGHT.

MILE, *mille paſſus*, a meaſure of length or diſtance, containing eight furlongs, &c. See the article MEASURE.

The Engliſh ſtatute mile is fourſcore chains, or 1760 yards; that is, 5280 feet.

We ſhall here give a table of the miles in uſe among the principle nations of Europe, in geometrical paces, 60,000 of which make a degree of the equator.

	Geometrical paces.
Mile of Ruſſia	750
of Italy	1000
of England	1250
of Scotland and Ireland	1500
Old league of France	1500
The ſmall league, ib.	2000
The mean league, ib.	2500
The great league of France	3000
Mile of Poland	3000
of Spain	3248
of Germany	4000
of Sweden	5000
of Denmark	5000
of Hungary	6000

MILIARY-FEVER, a malignant fever, ſo called from the eruption of certain puſtules reſembling millet-ſeeds.

MILITARY, ſomething belonging to the ſoldiery or militia.

MILITARY ARCHITECTURE, the ſame with fortification. See FORTIFICATION.

MILITARY ART, the ſcience or art of making or ſuſtaining war to advantage.

MILITARY WAYS, *Viæ Militares*, the large Roman roads which Agrippa procured to be made through the empire in Auguſtus's time, for the marching of troops and conveying of carriages. Theſe were paved from the gates of Rome, to the utmoſt limits of the empire. See ROAD.

MILITIA, in general, denotes the body of ſoldiers, or thoſe who make profeſſion of arms.

In a more reſtrained ſenſe, militia denotes the trained bands of a town or country, who arm themſelves, upon a ſhort warning, for their own defence. So that, in this ſenſe, militia is oppoſed to regular or ſtated troops.

MILK, *Lac*, a well known animal fluid, which nature prepares in the breaſts of women, and the udders of other animals, for the nouriſhment of their young. Milk, according to Boerhaave, is a liquor prepared from the aliment chewed in the mouth, digeſted in the ſtomach, perfected by the force and juices of the inteſtines, and elaborated by means of the meſentery and its gland and juices, and the juices of the thoracic duct. It has undergone ſome actions of the veins, arteries, heart, lungs, and juices, and began to be aſſimilated; yet may ſtill be had ſeparate and diſcharged out of the body. And thus by their own milk, prepared from the proper matter of the chyle, all the known lactiferous animals are nouriſhed, both male and female. For milk is always prepared from chyle as well in men as in women, in virgins and barren women, in mothers and nurſes. Whence every ſuch animal conſiſts, is nouriſhed, and lives on its own proper milk; and from this alone prepares all the other parts, both the ſolid and fluid, by means of the vital actions. It is alſo certain that many live for years by feeding on milk alone, and perform all the actions of life, and have all the ſolid and fluid parts of their bodies perfectly elaborated: the ſerum, therefore, the blood, the lymph, the ſpirits, bones, cartilages, membranes, and veſſels, proceed from milk; and milk muſt contain in itſelf the matter of all the parts of the human body.

Milk *of Sulphur*. See Sulphur.

Milk-Vetch, *Aſtragalus*, in botany. See Astragalus.

Milk-Wort, *Polygala*, in botany. See Polygala.

MILL, a machine or engine for grinding corn, &c. of which there are ſeveral kinds, according to the various methods of applying the moving power; as water-mills, wind-mills, mills worked by horſes, &c.

In water-mills the momentum of the water is the moving power, and the attrition of the two ſtones in grinding, is the force to be overcome. Of theſe there are two kinds, viz. thoſe where the force of the water is applied above the wheel, and thoſe where it is applied below the wheel; the former being called over-ſhot, and the latter under-ſhot mills; and to theſe we may add a breaſt-mill; where the water ſtrikes againſt the middle of the wheel.

MILLEFOLIUM, yarrow, in botany. See the article Achillea.

MILLENARIANS, or Chiliasts, a name given to thoſe, who, in the primitive ages, believed that the ſaints will one day reign on earth with Jeſus Chriſt a thouſand years. The former appellation is of latin original, the latter of Greek, and both of the ſame import.

The millenarians held that after the coming of antichriſt, and the deſtruction of all nations, which ſhall follow, there ſhall be a firſt reſurrection of the juſt alone: that all who ſhall be found upon earth, both good and bad ſhall continue alive; the good, to obey the juſt who are riſen, as their princes; the bad, to be conquered by the juſt, and to be ſubject to them: that Jeſus Chriſt will then deſcend from heaven in his glory: that the city of Jeruſalem will be rebuilt, enlarged, embelliſhed, and its gates ſtand open night and day. They applied to this new Jeruſalem, what is ſaid in the Apocalypſe, ch. xxi. and to the temple, all that is written in Ezekiel xxxvi. Here they pretended Jeſus Chriſt will fix the ſeat of his empire, and reign a thouſand years with the ſaints, patriarchs and prophets, who will enjoy perfect and uninterrupted felicity.

This reign of our Saviour on earth is uſually ſtyled the millenium, or reign of a thouſand years.

MILLEPES, the common Wood-louse, a ſpecies of the oniſcus with a blunt forked tail.

MILLERIA, in botany, a genus of plants, whoſe flowers are compounded and radiated, conſiſting of ſeveral hermaphrodite and female corrollulæ; the hermaphrodite are monopetalous, tubuloſe, and quinquedentated; and the female are ligulated, obtuſe, concave, and emarginated; there is ſcarce any viſible recepticle for the ſeeds, which are ſingle, without down, and produced only from the female florets.

MILLET, *milium*, in botany, a genus of plants, of the grameneous kind, the flower cup of which is a bivalvular glume, the corolla is leſs than the cup, and is alſo bivalvular; it has three very ſhort capillary filaments terminated by oblong antheræ: the ſeeds are roundiſh and covered by the corolla.

The ſeeds of millet are much uſed as a common aliment in the eaſtern countries, where they boil it in milk, it having the ſame virtues as rice: they are accounted drying, and recommended in fluxes; they are alſo ſaid to promote ſweat and urine very powerfully.

MILLING, in the manufacture of cloth, the ſame with fulling. See Fulling.

Milling of ſilk, is an operation otherwiſe called throwing.

MILLION, in arithmetic, the number of ten hundred thouſand, or a thouſand times a thouſand.

MILVUS, the kite, in ornithology, a ſpecies of falcon, with a forked tail, a yellow cera, a brown body, and a whitiſh head. It is a very common bird with us, about the ſize of a large tame pigeon.

MIME, μιμος, in the antient comedy, a perſon who acted any character by mere geſtures, and hence denominated pantomine. See the article Pantomime.

MIMESIS, μιμησις, in rhetoric, the imitating the voice and geſtures of another perſon.

MIMOSA, the ſenſitive plant, in botany, a genus, whoſe flower has a ſingle ſmall infundibuliform corrolla, lightly cut at the extremity into five parts; the ſtamina are a number of long hairy filaments, terminated with incumbent antheræ; the fruit is a long articulated pod, containing ſeveral compreſſed roundiſh ſeeds.

To this genus Linnæus has added the acacia of Tournefort, and the inga of Plumier.

There are ſeveral ſpecies of the mimoſa, but the ſenſative plant, or humble plant (ſo denominated from its remarkable property of receding from the touch, and giving ſigns as it were of animal life and ſenſation, which has hitherto not been accounted for) performs its motions by means of two diſtinct articulations; that is, either by touching the leaves lightly they then contract themſelves together, and if the motion wherewith the plant is moved be ſtrong, then the leaves not only contract but the footſtalk which ſupports them alſo declines from that part of it which connects with the branch, as though it were faſted to it by a kind of hinge; when the leaves are thus ſtruck, the whole plant appears as though it were withered, like others which happen to be tranſplanted in very hot weather; but it may be remarked, that theſe plants are more ſuſceptible of the touch in very warm weather then when it is cool, and in about ten minutes or a quarter of an hour the leaves expand again.

The ſenſitive plant being a native of the Weſt Indies, it therefore requires a hot-houſe in this climate: they are commonly propagated from ſeeds, which ſhould be ſown in the ſpring upon a hot bed; in about three weeks after the plants are come up they ſhould be tranſplanted ſingly into ſmall pots, and plunged in a freſh hot bed, and afterward when ſummer is come on may be removed into a hot-houſe; or where that conveniency is wanting, they may be kept under a common glaſs light, it being neceſſary to protect them from the open air, not only on account of their tenderneſs, but alſo to keep their leaves expanded; in the hot-houſe they may be kept the winter, and the following ſummer they will flower and perfect their ſeeds.

MIMULUS, in botany, a genus of plants, whoſe flower is monopetalous and ringent, the tube is the length of the cup, and the limb is bilabiated: the ſtamina are four ſlender filaments, topped with bifid reniform antheræ. The fruit is an oval bilocular capſule, containing many ſmall ſeeds

MIMUSOPS, in botany, a genus of plants, whoſe flower contains eight lanceolated patent petals, with eight very ſhort piloſe filaments, topped with erect oblong antheræ. The fruit is an oval acuminated drupe, incloſing one or two oval ſeeds.

MINA, in Grecian antiquity, a money of account, equal to an hundred drachms. See Money, and Drachm.

MINCIO, or Menzo, a river of Italy, which, after running through the dutchy of Mantua diſcharges itſelf into the Po, at Borgoforte.

MIND, *mens*, νȣς, a thinking intelligent being, otherwiſe called ſpirit, in oppoſition to matter or body. See the articles Body and Spirit.

MINE, in natural hiſtory, a place under ground, where metals, minerals, or even precious ſtones are dug up.

Mine, in the military art, denotes a ſubterraneous canal, or paſſage, dug under the wall or rampart of a fortification, intended to be blown up by gun-powder.

MINERAL, in natural hiſtory, is uſed, in general, for all foſſil bodies, whether ſimple or compound, dug out of a ſubterraneous mine, from which it takes its denomination.

Mineral *Waters*, in medicine, all thoſe wherein any medicinal virtue, beſides thoſe of common water, are found.

Theſe mineral waters are of various kinds, but they are conſidered under the general titles of chalybeate, purgative, and alterative.

MINERVALIA, in Roman antiquity, feſtivals celebrated in honour of Minerva, in the month of March; at which time the ſcholars had a vacation, and uſually made a preſent to their maſters, called from this feſtival minerval.

Theſe feſtivals were otherwiſe called quinquatria, from their laſting five days. See the article Quinquatria.

MINHO, a great river of Spain, which, taking its riſe in Gallicia, divides that province from Portugal, and falls into the Atlantic at Caminha.

MINIATURE, a delicate kind of painting, diſtinguiſhed from all others by the ſmallneſs of the figures, it being performed with dots or points, inſtead of lines; by the faintneſs of the colouring; its requiring to be viewed very near; and by its being uſually done on vellum.

This is the niceſt and moſt tedious of all kinds of painting, being performed wholly with the point of the pencil: for when the colours are laid on flat without dotting, though the figures be ſmall, and the ground either vellum or paper, it is not called painting in miniature, but waſhing.

MINIM, in muſic, a note equal to two crotchets, or half a ſemibreve.

MINIMS, a religious order in the church of Rome, founded by St. Francis de Paula, towards the end of the fifteenth century. Their habit is a coarſe black woollen ſtuff, with a woollen girdle of the ſame colour, tied in five knots. They are not permitted to quit their habit and girdle night or day. Formerly they went bare-footed, but are now allowed the uſe of ſhoes.

MINIMUM, in the higher geometry, the leaſt quantity attainable in a given caſe. See the article Maximum.

MINION, a piece of cannon, at preſent but little uſed in the field. For its length bore, and the weight of the ball it carries, ſee Cannon.

MINIUM, or Red-Lead, a preparation of lead uſed both in pharmacy and painting. It is made in the following manner: melt lead in a broad earthen veſſel unglazed, and ſtir it continually with a ſpatula till it be calcined into a grey powder; this is called the calx of lead: continue the fire, ſtirring it in the ſame manner, and it becomes yellow; in this ſtate it is called maſticot: after this put it into a reverberatory furnace, and it will calcine farther, and become of a fine red, which is the common minium or red-lead. Minium is uſed externally on many occaſions. It obtunds the acrimony of the humours, allays inflammations, and is excellent in cleanſing and healing old ulcers; and on theſe occaſions, it is uſed in many of the plaſters and ointments of the ſhops.

MINOR, in law, is an heir either male or female, before they arrive at the age of twenty-one; during the minority of ſuch, they are uſually incapable of acting for themſelves.

Minor, in logic, the ſecond propoſition of a regular ſyllogiſm.

Minor, in muſic, ſignifies leſs, and is applied to certain concords or intervals which differ from others of the ſame denomination by half a tone: thus we ſay a third minor, meaning a leſs third; a ſixth major and minor.

MINOTAUR, *minotaurus*, in antiquity, a fabulous monſter much talked of by the poets, feigned to be half man and half bull.

MINSTREL, an antient term for a fiddler, or player on any other kind of muſical inſtrument.

MINT, the place in which the king's money is coined. See Coinage.

MINT, *Mentha*, in botany, a genus of plants, whoſe flower is monopetalous, and divided into four almoſt equal ſegments at the limb; it has no pericarpium, but the ſeeds, which are four in number, are contained in the bottom of the cup.

There are various ſpecies of mint, as ſpear-mint, pepper-mint, calimint, orange-mint, curled or criſp mint, water-mint, with ſeveral others of leſs note; but the moſt uſeful are the ſpear-mint and pepper-mint, which are ſo well known, that a deſcription of them is unneceſſary; theſe ſpecies are cultivated in our gardens for culinary and medicinal purpoſes; they are eaſily propagated by parting their roots in the ſpring, or by planting cuttings of them in the ſummer months.

Spear-mint is ſtomachic, cephalic, and carminitive, it is excellent in the loſs of appetite, reachings to vomit, as alſo in ſtopping fluxes of the belly; as it reſolves coagulated blood, and eaſes the pains of the cholic; and its fragrant ſcent makes it enter into many compoſitions as a cephalic: it may be drank as tea, either green or dry, and the infuſion ſhould be ſtrong.

Externally it is uſed with good ſucceſs in fomentations outwardly applied, with hot cloths, to the ſtomach and belly in the forementioned caſes.

Pepper-mint is more pungent to the taſte than ſpear-mint: the diſtilled water from this plant is much in eſteem for its great uſe in flatulent cholics, and many cold diſeaſes; its effects are almoſt immediately felt, for it cauſes a glowing warmth to be felt throughout all parts of the body.

As the diſtilled water of all ſorts of mint is eſteemed a very wholeſome cordial dram, it might be ſubſtituted inſtead of thoſe intoxicating ſpirits which the common people make uſe of; for the pepper-mint water is as warm to the ſtomach as any other ſort of dram, and more ſo than thoſe noxious ſpirits; and if this was judiciouſly mixed with ſome other agreeable aromatic herbs, there might certainly be diſtilled a liquor much more palatable and wholeſome than what is now vended in common, whereby the lower claſs of people would be leſs debauched; therefore it will be better for the public not only if the leſs hurtful drams were made, but alſo by the introducing more generally the diſtillation of herbs, there will be leſs occaſion for the uſing of wheat for ſuch purpoſes; which is a matter of no ſmall conſequence to this nation.

When mint is to be cut for medicinal uſe, it ſhould be done in dry weather, juſt when it is in full flower; for if it is cut wet, it will change black and be good for nothing: it ſhould be dried in the ſhade, and afterwards hung up in a dry place, where it may remain till it is wanted.

Cat Mint, *Nepeta*, in botany. See the article Nepeta.

MINUET, in muſic, a very graceful kind of dance, which conſiſts of a coupee, a high ſtep, and a balance; it begins with a beat, and its motion is triple.

MINUSCULE, the ſmall letters, in contradiſtinction to the majuſculæ or capitals.

MINUTE, in geometry, the ſixtieth part of a degree of a circle.

Minute *of time*, the ſixtieth part of an hour.

Minute, in architecture, uſually denotes the ſixtieth, ſometimes the thirtieth part of a module.

Minute is alſo uſed for a ſhort memoir, or ſketch of a thing taken in writing.

MIRABILIS, marvel of Peru, in botany, a genus of plants whoſe flower is monopetalous and infundibuliform, having a long ſlender tube ſitting on a globoſe nectarium, with five filiform ſtamina. The fruit is an oval pentagonal nut, containing a ſingle ſeed.

Tournefort and Linnæus will have the root of a ſpecies of this genus to be the true jalap of the ſhops, but Houſton declares that the jalap is a root of a ſpecies of convulvulus; however, the roots of the known ſpecies of mirabilis are cathartic, and anſwer the ſame purpoſe as jalap if the doſe is given in a double quantity.

MIRACLE, is defined by Dr. Samuel Clarke, to be a work effected in a manner different from the common and regular method of providence, by the interpoſition either of God himſelf or ſome intelligent agent ſuperior to man.

MIRROUR, *Speculum*, in catoptrics, any poliſhed body, impervious to the rays of light, and which reflects them equally.

Mirrours were anciently made of metal; but, at preſent, are generally ſmooth plates of glaſs, tinned or quickſilvered on the back part, and called looking-glaſſes.

The doctrine of mirrours depends wholly on that fundamental law, that the angle of reflection is always equal to the angle of inicdence.

Let EH (plate LXXI. *fig.* 7.) be a concave mirrour, V its vertex, and C the center of its concavity. Let A be a ray of the ſun's light incident on the point E, and draw EC, which will be perpendicular to the mirrour in the point E; make the angle CEF equal to the angle AEC, then ſhall EF be the reflected ray. Thus alſo HF will be the reflected ray of the incident one DH, at an equal dſtance on the other ſide of the axis BV.

If now the points E and H be taken very near the vertex V, we ſhall have EF, or HF, very nearly equal to FV; but $EF = FC$; therefore $FV = FC = \frac{1}{2} CV$. That is, the focal diſtance FV of parallel rays will be at the diſtance of half the radius CV of the concavity of the mirrour, from vertex V, in the axis BV.

After the ſame manner a convex mirrour is ſhewn to reflect the rays AE, DH, (*fig.* 8.) into EF, HF, as if they came diverging from a point *f* in the axis CV, which is half the radius CV diſtant from the vertex V. But ſince the rays do not actually come at, or from the focus *f*, it is called the imaginary or virtual focus. See Focus.

Parallel rays falling directly on a plane ſpeculum are reflected back upon themſelves; if they fall obliquely, they are reflected in the ſame angle, and parallel as they fell. Hence there is no ſuch thing, properly ſpeaking, as a focus belonging to a plane ſpeculum, neither real nor virtual.

The focus F, or *f*, of parallel rays, is called the ſolar focus; becauſe in that the image of the ſun is formed, and of all objects very remote. But the focus of any object ſituated near the mirrour will have its diſtance from the vertex more or leſs than half the radius; the rule in all caſes being as follows:

Multiply the diſtance of the object into the radius of the mirrour, and divide the product by the ſum of the radius and twice the diſtance of the object; the quotient will be the focal diſtance of a convex mirrour.

Again for a concave mirrour, the ſame product of the radius into the diſtance of the object, divided by the difference of radius and twice the diſtance of the object, will give the focal diſtance VF or V*f*. And here we are to obſerve, that, as twice the diſtance of the object, is leſſer or greater than the radius, ſo the focus will be poſitive or negative, that is, behind the glaſs or before it.

The image of the object is formed in the focus proper to its diſtance: and, ſince the writers on optics demonſtrate that the angles under which the object OB (*fig.* 9.) and its image IW are ſeen from the center or vertex of the mirrour C are always equal, it follows, that the image IW will be always in proportion to the object OB, as the focal diſtance VF to the object's diſtance GV. The poſition of the object will be always erect at a poſitive focus, or behind the ſpeculum; diminiſhed by a convex, and magnified by a concave one. Hence, ſince a convex has but one, *viz.* an affirmative focus, ſo it can never magnify any object, howſoever poſited before it.

The poſition of the image in a negative focus, or that before the glaſs, will be ever inverted; and, if nearer the vertex than the center C, it will be leſs; if farther from it, it will be greater than the object; but in the center it will be equal to the object, and ſeem to touch it.

The image formed by a plane ſpeculum is erect; large as the life; at the ſame apparent diſtance behind the glaſs as the object is before it; and on the ſame ſide of the glaſs with the object. Thoſe properties render this ſort of mirrour of moſt common uſe, *viz.* as a looking-glaſs.

If the rays fall directly, or nearly ſo, on a plane mirrour and the object be opake, there will be but one ſingle image formed, or at leaſt be viſible; and that by the ſecond ſurface of the ſpeculum, and not by the firſt, through which the rays do moſt of them paſs.

But if the object be luminous, and the rays fall very obliquely on the ſpeculum, there will be more than one image formed, to an eye placed in a proper poſition to view them. The firſt image being formed by the firſt ſurface will not be ſo bright as the ſecond, which is formed by the ſecond ſurface. The third, fourth, *&c.* images, are produced by ſeveral reflexions of the rays between the two ſurfaces of the ſpeculum; and, ſince ſome light is loſt by each reflection, the images from the ſecond will appear ſtill more faint and obſcure, to the eighth, ninth, or tenth, which can ſcarcely be diſcerned at all.

MISCHNAH, or MISNAH, the code or collection of the civil law of the Jews.

MISDEMEANOR, in law, ſignifies a heinous offence or fault, particularly in the execution of an office.

MISEN, or MIZEN, in a ſhip. See the article MIZEN.

MISERERE MEI, in medicine, the name by which ſome call the illiac paſſion.

MISLETOE, *Viſcum*, in botany, a plant, which inſtead of rooting and growing in the earth like other plants, fixes itſelf and takes root on the branches of trees, ſpreading out in dichotomous branches ſo as to form a large buſh; the flowers come out from the wings of the ſtalk, and are male on ſome plants and female on others; they are both apetalous: the male flower conſiſts of a cup, formed of four oblong leaves, each having an oblong acuminated antheræ affixed to it: the female flower has a deciduous cup, formed of four ſmall oval leaves, ſitting on an oblong three-cornered germen, which becomes a ſmooth, round, unilocular berry, containing a fleſhy, compreſſed, heart-ſhaped ſeed.

Miſletoe grows more readily on the apple and aſh, and other ſmooth rind trees, than on others. It is ſuppoſed that the miſletoe-thruſh, which feeds on the berries of this plant in winter (at which time they are ripe) often carries the ſeeds from tree to tree, for the viſcous part of the berry which ſurrounds the ſeed, ſometimes ſticks faſt to the outer part of the bill of the bird, which to diſengage himſelf from, ſtrikes it againſt the branches of a neighbouring tree, and by that means, leaves the ſeed ſticking on the the bark, which will grow in the following winter; and it may be propagated by art in the ſame manner. Miſletoe is ſometimes found on the oak, though but rarely, which, perhaps, is the reaſon why that is valued more than others.

Miſletoe is eſteemed as a great anti-epileptic, and good in other nervous diſorders; the doſe of it in powder is from one dram to two. The berries purge upwards and downwards with great violence, and therefore are not proper to be given inwardly.

MISNOMER, in law, a miſnaming, or miſtaking a perſon's name.

MISPRISION, ſignifies, in general, ſome neglect or overſight; as where a perſon is privy to a treaſon or felony committed by another, and neglects to reveal it to the king or his council, or to a magiſtrate, but entirely conceals it: this is called miſpriſion of thoſe crimes.

MISSIONARIES, ſuch eccleſiaſtics as are ſent by any Chriſtian church, into pagan or infidel countries, to convert the natives, and eſtabliſh the Chriſtian religion among them.

MISUSER, in law, ſignifies ſome abuſe of any particular liberty or benefit. The charter of a corporation, as well as an office, may be forfeited by miſuſer.

MITCHELLA, in botany, a genus of the tetandria monogynia claſs of plants, the calyx of which conſiſts of two flowers, placed upon the germen; the corolla is monopetalous and funnel-ſhaped: the fruit is a bipartite globoſe berry: the ſeeds are compreſſed and callous.

MITE, a ſmall coin, formerly current, equal to about one-third part of a farthing.

It alſo denotes a ſmall weight, uſed by the moneyers: it is equal to the twentieth part of a grain, and is divided into twenty-four doits.

MITE, in zoology. See ACARUS.

MITELLA, in botany, a genus of the decandria digynia claſs of plants, the corolla whereof conſiſts of five patent petals, of an oblong figure, longer than the ſegments of the cup, with their ungues narrow, and inſerted into the calyx: the fruit is a capſule of a globoſe figure, but with a point formed of two valves, and opening between, containing only one cell: the ſeeds are numerous, and of a roundiſh oblong figure.

MITHRADATE, in pharmacy, a compound medicine in form of an electuary, ſerving either as a remedy or preſervative againſt poiſons; being alſo accounted a cordial, opiate, ſudorific, and alexipharmic.

MITRALES VALVULÆ, mitral valves, in anatomy, two valves ſituated in the left ventricle of the heart, at the ingreſs of the pulmonary vein, ſerving to hinder the ingreſs and regreſs of the blood from the heart into the veins again, while they are conſtricted.

MITRE, a ſacerdotal ornament, worn on the head by biſhops and certain abbots on ſolemn occaſions; being a ſort of cap, pointed and cleft at top.

MITTIMUS, as generally uſed, hath two ſignifications. 1. It ſignifies a writ for removing and transferring of records from one court to another. 2. It ſignifies a precept, or command in writing, under the hand and ſeal of a juſtice of the peace, directed to the gaoler or keeper of ſome priſon, for the receiving and ſafe-keeping of an offender charged with any crime until he be delivered by due courſe of law.

MIXT, or MIXED BODY, in philoſophy and chemiſtry, that which is compounded of different elements or principles; in which ſenſe, it ſtands contradiſtinguiſhed from ſimple or elementary, which is applied to bodies conſiſting of one principle only, as the chemiſts take ſulphur, ſalt, &c. to do. The buſineſs of chemiſtry is, to reſolve mixt bodies into their principles or component parts.

MIXT ACTION, in law, is an action, partly real and partly perſonal, which lies both for the thing detained, and againſt the perſon of the detainer. See ACTION.

MIXTURE, a compound, or aſſemblage of ſeveral different bodies in the ſame maſs.

MIXTURA SIMPLEX, a medicinal preparation made in the following manner: Take of the ſpiritus theriacalis camphoratus of Bates, ten ounces; ſpirit of vitriol, two ounces; rectified ſpirit of tartar, ſix ounces. Digeſt in a glaſs veſſel, hermetically ſealed, for three weeks. This medicine excites ſweat, reſiſts putrefaction, and is good in malignant fevers. The doſe is about a dram.

MIZEN, in the ſea-language, is a particular maſt or ſail. The mizen-maſt ſtands in the ſternmoſt part of the ſhip. In ſome great ſhips there are two of theſe; when that next the main-maſt is called the main-mizen, and that next the poop, the bonaventure-mizen. The length of the mizen-maſt is, by ſome, accounted the ſame with the height of the main-top-maſt from the quarter-deck; or half the length of the main-maſt, and half as thick. The ſail which belongs to the mizen-maſt, is called the mizen-ſail: and when the word mizen is uſed at ſea, it always means the ſail. The uſe of the mizen is to keep the ſhip cloſe to the wind, or when a ſhip rides at anchor, to back her aſtern, ſo that ſhe may not foul her anchor, on the turning of the tide.

MNEMONIC, ſomething relating to the memory. See MEMORY.

MNIUM, in botany, a genus of moſſes, conſiſting of ſtalks furniſhed with leaves, and producing capſules raiſed on pedicles, like thoſe of the other moſſes of this claſs; but beſides theſe, there are other pedicles, bearing a kind of naked heads, with a duſty ſurface, and having no calyptræ. Theſe two kinds of heads are, in ſome ſpecies, produced on the ſame plant; and in others, on different plants of the ſame ſpecies. The pedicles that ſupport the capſules are long and naked; whereas thoſe ſupporting the duſty heads are ſhort, and in ſome ſpecies furniſhed with ſhort leaves.

MOAR-LOVRE, in huſbandry, a ſort of blight, which happens moſtly on light land, from the earth's ſinking away from the roots, ſo that the plants fall down to the earth.

To remedy this, they turn a ſhallow furrow againſt the rows, when they are ſtrong enough to bear it, and when the mould is fine and dry; for then, the motion of the ſtalks by the wind, will cauſe ſuch earth to run through the rows, and ſettle about the roots, and cover them.

MOARING, or MOORING, in the ſea-language. See the article MOORING.

MOAT, or DITCH, in fortification, a deep trench dug round the rampart of a fortified place, to prevent ſurprizes.

The brink of the moat, next the rampart, is called the ſcarpe; and the oppoſite one, the counterſcarpe.

MOBILE, or PRIMUM MOMILE, the ninth ſphere in the Ptolemaic Syſtem of Aſtronomy. See the article PTOLEMAIC.

MODE, *Modus*, in philoſophy, denotes the manner of a thing's exiſtence, which is twofold, viz. ſimple or mixed.

Simple modes are only combinations of the ſame ſimple idea: thus, by adding units together, in diſtinct ſeparate collections, we come by all the ſeveral modes of numbers, as a dozen, a ſcore, a thouſand, &c.

Mixed modes, on the contrary, are compounded of ſimple ideas of different kinds, as beauty, which conſiſts in a certain compoſition of colour and figure, cauſing delight in the beholder: ſuch alſo is theft, which is the concealed change of the poſſeſſion of a thing, without the conſent of the proprietor.

MODE, in muſic, is defined to be a particular manner of conſtituting the octave; or, it is the melodious conſtitution of the octave, as it conſiſts of ſeven eſſential ſounds, beſides the key or fundamental. See the article OCTAVE.

MODEL, in a general ſenſe, an original pattern, propoſed for any one to copy or imitate.

This word is particularly uſed, in building, for an artificial pattern made in wood, ſtone, plaſter, or other matter, with all its parts and proportions, in order for the better conducting and executing ſome great work, and to give an idea of the effect it will have in large. In all great buildings, it is much the ſureſt way to make a model in relievo, and not to truſt to bare deſign or draught. There are alſo models for the building of ſhips, and for extraordinary ſtair-caſes, &c.

They alſo uſe models in painting and ſculpture; whence, in the academies, they give the term model to a naked man or woman, diſpoſed in ſeveral poſtures to give an opportunity to the ſcholars to deſign him in various views and attitudes.

MODERATOR, in the ſchools, the perſon who preſides at a diſpute, or in a public aſſembly: thus, the preſident of the annual aſſembly of the church of Scotland, is ſtiled moderator.

MODERN, in a general ſenſe, ſomething new, or of our time, in oppoſition to what is antique or ancient.

MODIFICATION, in philoſophy, that which modifies a thing, or gives it this or that manner of being.

MODILLIONS, in architecture, ornaments in the corniche of the Ionic, Corinthian, and Compoſite columns.

The modillions are little inverted conſoles, or brackets, in form of an S, under the ſoffit of the corniche, ſeeming to ſupport the projecture of the larmier; though in reality they are no more than ornaments.

They ought always to be placed over the middle of the column. They are particularly affected in the Corinthian order, where they are uſually enriched with ſculpture. Their proportions ought to be ſo adjuſted, as to produce a regularity in the parts of the ſoffits. The intermodillions (i.e. the diſtances between them) depend on the inner columns, which oblige the modillions to be made of a certain length and breadth, in order to render the intervals perfect ſquares, which are always found to have better effects than parallelograms. To this it muſt be added, that in adjuſting the modillions, care ſhould be taken that they have ſuch a proportion as that when the orders are placed over one another, there be the ſame number in the upper order as in the lower, and that they fall perpendicular over one another.

MODIOLUS, in ſurgery, an inſtrument otherwiſe called a trepan. See TREPAN.

MODIUS, in antiquity, a kind of dry meaſure, in uſe among the Romans, for ſeveral ſorts of grain. See MEASURE.

MODO ET FORMA, *in manner and form*, among lawyers, are words of art, frequently uſed in pleadings, &c. and particularly in a defendant's anſwer, wherein he denies to have done what is laid to his charge in manner and form, as affirmed by the plantiff.

MODULATION, in muſic, the art of keeping in, or changing the mode or key. See the articles KEY and MODE.

Under this term is comprehended, the regular progreſſion of ſeveral parts, through the ſounds that are in the harmony of any particular key, as well as the proceeding naturally and regularly from one key to another; the rules of modulation, in the firſt ſenſe, belonging to harmony and melody. See the articles HARMONY and MELODY.

MODULE, in architecture, a certain meaſure or bigneſs, taken at pleaſure, for regulating the proportions of columns, and the ſymmetry or diſpoſition of the whole building.

Architects generally chooſe the ſemi-diameter of the bottom of the column for their module, and this they ſub-divide into parts or minutes. The module of Vignola, which is a ſemi-diameter, is divided into twelve parts in the Tuſcan and Doric, and into eighteen for the other orders.

The module of Palladio, Scamozzi, M. Cambray, Deſgodetz, Le Clerk, &c. (which is alſo equal to the ſemi-diameter) is divided into thirty parts or minutes in all the orders.

The whole height of the column is divided, by ſome, into twenty parts for the Doric, twenty-two and a half for the Ionic, twenty-five for the Roman, &c. and one of theſe parts is made a module, to regulate the reſt of the building.

MODUS DECIMANDI, in law, is where money, land, or other valuable conſideration, has been given, time out of mind, to the miniſter or parſon of any certain place in the room of tithes.

A clergyman may ſue in a ſpiritual court for a modus decimandi; yet if the modus is denied there, or a cuſtom is to be tried, the trial thereof belongs to the courts of common law. When lands are converted to other uſes, as in the caſe of hay-ground turned into tillage, the modus may be diſcharged, and the tithes paid again in kind.

MOEDORE, or MOIDORE. See the article MOIDORE.

MOHERINGIA, moſſy-chickweed, in botany, a genus of the octandria-digynia claſs of plants, the flower of which is compoſed of four ſhort undivided petals; and its fruit is a ſubgloboſe capſule, with one cell, in which are contained numerous roundiſh ſeeds.

It is called by ſome, alſine muſcoſa.

MOGULS, or MONGULS, hoards or tribes of vagrant Tartars, on the north of India, from whom the moguls or ſovereigns of India, as well as of the Uſbec-Tartars, are deſcended.

MOHAIR, in commerce, the hair of a kind of goat, frequent about Angoura, in Turky; the inhabitants of which city are all employed in the manufactures of camblets, made of this hair.

MOHAIR-SHELL, in natural hiſtory, a ſpecies of voluta. See VOLUTA.

MOIDORE, or MOEDORE, a Portugueſe gold coin. See EXCHANGE.

MOIETY, *medietas*, the half of any thing. See MEDIETAS.

MOINEAU, in fortification, is a flat baſtion raiſed between two other baſtions, when a re-entering angle before a curtain is too long.

The moineau is commonly joined to the curtain, but it is ſometimes ſeparated from it by a foſs, in which caſe it is called a detached baſtion. The moineau is not raiſed ſo high as the works of the place, becauſe it ought to be expoſed to the fire of the place, in caſe the enemy ſhould lodge themſelves in it.

MOISTURE, a term ſometimes uſed to denote animal fluids, the juices of plants, or dampneſs of the air, or other bodies.

Radical MOISTURE, among phyſicians, ſignifies a vital fluid, which nouriſhes and maintains life, as oil does a lamp. However, Dr. Quincy obſerves, that ſuch a fluid is a mere chimera, unleſs we thereby mean the maſs of blood. See BLOOD.

MOLA, in anatomy, the ſame with patella. See PATELLA.

MOLA, the ſun-fiſh, in ichthyology, a ſpecies of oſtracion, of a compreſſed roundiſh figure, with four holes on the head.

This is a very ſingular fiſh, weighing often more than an hundred pounds: its figure, at firſt ſight, more reſembles the head of ſome large fiſh, cut off from the body, than that of a complete animal.

MOLA, a mole, in medicine. See the article MOLE.

MOLARES, or DENTES MOLARES, in anatomy, the large teeth, called in Engliſh, grinders. See the article TOOTH.

MOLE, *talpa*, in zoology, makes a genus of quadrupeds, of the order of the feræ, thus characterized: the feet are formed like hands, and calculated for digging; and it has no external ears.

MOLE-CRICKET, the ſame with gryllo talpa. See GRYLLO TALPA.

MOLE, *mola Carnea*, in medicine, a maſs of fleſhy matter, of a ſpherical figure, generated in the uterus, or womb, and ſometimes miſtaken for a child. Its ſize is various, from that of a large nut to that of a fœtus. Some moles are ſoft and ſpungy, and others membranous, with a cavity in the middle. Sometimes they are filled with ſerous matter, and ſometimes with hydatides.

Mole, *Moles*, is a maſſive work of large ſtones laid in the ſea by means of cofferdams, extending before a port, either to defend the harbour from the impetuoſity of the waves, or to prevent the paſſage of ſhips without leave.

MOLINE, or Cross-Moulin, in heraldry, the ſame with that called Fer de moulin. See Fer de Moulin.

MOLLUGO, baſtard-madder, in botany, a plant of the triandria-trigynia claſs, without any flower petals. Its fruit is a capſule of a ſomewhat oval figure, with three cells, in each of which there is a number of kidney-ſhaped ſeeds.

It is ſaid to have the ſame medicinal virtues as madder.

MOLOSSES, in commerce, the thick fluid matter remaining after the ſugar is made, reſembling ſyrup. See Sugar.

MOLOSSUS, in Greek and Latin poetry, a foot compoſed of three long ſyllables, as *delectant*.

MOLTA, or Moltura, a toll or duty formerly paid by vaſſals to their lord, for grinding their corn in his mill.

MOLTING, the change of feathers, hairs, or horns, in birds and beaſts.

MOLUCCA-Beans, *Moluccella*, in botany, a genus of plants, the flower of which is monopetalous and labiated; the upper-lip being entire, and the lower one trifid: the ſeeds are turbinated, and contained in the bottom of the cup.

MOMENT, in the doctrine of time, an inſtant, or the moſt minute and indiviſible part of duration. See Time.

Strictly ſpeaking, however, a moment ought not to be conſidered as any part of time, but only as the termination or limit thereof.

Moment, in the doctrine of infinites, denotes the ſame with infiniteſimal. See the article Infinitesimal.

MOMENTUM, in mechanics, ſignifies the ſame with impetus, or the quantity of motion in a moving body; which is always equal to the quantity of matter, multiplied into the velocity; or, which is the ſame thing, it may be conſidered as a rectangle under the quantity of matter and velocity. See Motion.

MONADELPHIA, in botany, a claſs of plants, the ſixteenth in order, ſo called becauſe the ſtamina of the flowers are ſo interwoven as to form one body; or rather, becauſe the ſtamina are connected, or coaleſce at the baſe.

MONANDRIA, in botany, a claſs of plants, the firſt in order, with only one ſtamen, or male part in each flower.

The monandria are ſubdived into two orders, which are denominated monandria-monogynia, and monandria-digynia, according as they contain one or two ſtyles.

MONARDIA, in botany, a genus of plants, with a monopetalous flower, the rim of which is ringent: the ſeeds are four in number, roundiſh, and contained in the bottom of the cup.

MONASTERY, a convent, or houſe built for the reception and entertainment of monks, mendicant friars, or nuns, whether it be an abbey, priory, &c.

MONASTIC, ſomething belonging to monks. See Monks.

MONDAY, *Dies Lunæ*, the ſecond day of the week, ſo called as being anciently ſacred to the moon, q. d. moon-day.

MONEY, *Moneta*, a piece of matter, commonly metal, to which public authority has affixed a certain value and weight to ſerve as a medium in commerce.

Money is uſually divided into real and imaginary. Real money includes all coins, whether gold, ſilver, copper, or the like; ſuch as guineas, crowns, piſtoles, pieces of eight, ducats, &c.

Imaginary money, or money of account, is that which has never exiſted, or, at leaſt, which does not exiſt in real ſpecies; but is a denomination invented or retained to facilitate the ſtating of accounts, by keeping them ſtill on a fixed footing, not to be changed like current coins, which the authority of the ſovereigns ſometimes raiſes or lowers, according to the exigencies of the ſtate, of which kinds are pounds, livres, marks, maravedes, &c.

MONEYERS, Moneyors, or Moniers, officers of the mint, who work and coin gold and ſilver money, and anſwer all waſte and charges.

MONITORY Letters, are letters of warning and admonition, ſent from an eccleſiaſtical judge, upon information of ſcandals and abuſes, within the cognizance of his court.

MONK, a perſon who wholly dedicates himſelf to the ſervice of religion, in ſome monaſtery, under the direction of ſome particular ſtatutes and rules.

The moſt probable account of the origin of the monks is, that in the decian perſecution, in the middle of the third century, many perſons in Egypt, to avoid the fury of the ſtorm, fled to the neighbouring deſerts and mountains, where they not only found a ſafe retreat, but alſo more time and liberty to exerciſe themſelves in acts of piety and divine contemplations; which ſort of life became ſo agreeable, that when the perſecution was over, they refuſed to return to their habitations again, chooſing rather to continue in thoſe cottages and cells, which they had made for themſelves in the wilderneſs. From that time to the reign of Conſtantine, monachiſm was confined to the hermits or anachorets, who lived in private cells in the wilderneſs: but when Pachomius had erected monaſteries, other countries preſently followed the example.

The manner of admiſſion to the monaſtic life was uſually by ſome change of habit, not to ſignify any religious myſtery, but only to expreſs their gravity and contempt of the world. Long hair was always thought an indecency in men, and ſavouring of ſecular vanity, and therefore they polled every monk at his admiſſion, to diſtinguiſh him from ſeculars; but they never ſhaved them, leſt they ſhould look like the prieſts of Iſis. St. Jerome, ſpeaking of the habits of the monks, intimates that it differed from that of others only in this, that it was cheaper, coarſer, and meaner raiment. We read of no ſolemn vow, or profeſſion, required at their admiſſion; but they underwent a triennial probation, during which time they were inured to the exerciſes of the monaſtic life. If, after that time was expired, they choſe to continue the ſame exerciſes, they were then admitted, without any farther ceremony, into the community. As the monaſteries had no ſtanding revenues, all the monks were obliged to maintain themſelves by their daily labour: they had no idle mendicants among them, but looked upon a monk who did not work, as a covetous defrauder. Every ten monks were ſubject to one, who was called decanus, or dean, from his preſiding over ten; and every hundred had another officer called centenarius, from his preſiding over an hundred; and above theſe were the fathers of the monaſteries, alſo called abbots. The buſineſs of the deans was to exact every man's daily taſk, and carry it to the ſteward, who gave a monthly account of it to the abbot.

MONK-SEAM, among ſailors, is the ſewing the edges or ſelvedges of ſails together, over one another on both ſides, to make it the ſtronger.

MONKEY, *Simia*, in zoology, a numerous genus of quadrupeds of the order of the anthropomorpha, or quadrupeds that reſemble the human figure: their face is naked; the claws are roundiſh and flattiſh, in ſome degree like the nails on the human hand; and they have both an upper and lower eyelid.

MONOCHORD, a muſical inſtrument, compoſed of one ſtring, uſed to try the variety and proportion of ſounds.

It is formed of a rule, divided and ſubdivided into ſeveral parts, on which there is a moveable ſtring ſtretched upon two bridges, at each extreme. In the middle between theſe is a moveable bridge, by means of which, in applying it to the different diviſions of the line, the ſounds are found to bear the ſame proportion to each other, as the diviſions of the line, cut by the bridge. There are alſo monochords with forty-eight fixed bridges.

The monochord is alſo called the harmonical canon, or the canonical rule, becauſe it ſerves to meaſure the degrees of gravity or acuteneſs.

Monochord is alſo uſed for any muſical inſtrument, that conſiſts of only one ſtring or chord; in this ſenſe the trumpet-marine may properly be called a monochord.

MONOCULUS, in zoology, a genus of cruſtaceous water-inſects of the aptera-order, the body of which is ſhort, roundiſh, and covered with a firm cruſtaceous ſkin; its fore legs are ramoſe, and ſerve for leaping and ſwimming: and it has only one eye, compoſed of three ſmaller ones.

MONODON, in ichthyology, a fiſh of the whale-kind, otherwiſe called narwal, or the ſea-unicorn.

MONODY, in ancient poetry, a mournful kind of ſong, ſung by a perſon all alone, to give vent to his grief.

MONOECIA, in botany, one of Linnæus's claſſes of plants, the twenty-firſt in order; in which the male and female flowers are placed ſeparately on the ſame plant, or rather on different ſtalks growing from the ſame root.

Of the plants belonging to this claſs, ſome have only one ſtamen, and others have three, four, five, ſix, or more ſtamina; whence the ſubordinate orders of monoecia-monandria, monoecia-triandria, &c. others again are monadelphous, others ſyngeneſious, and others gynandrous.

MONOGRAM, a character or cypher, compoſed of one, two, or more letters, interwoven; being a kind of abbreviation of a name, antiently uſed as a ſeal, badge, arms, &c.

MONOLOGUE, in poetry, a dramatic ſcene, in which a perſon appears alone on the ſtage, and ſpeaks to himſelf.

MONOMIAL, in algebra, a root or quantity that has but one name, or conſiſts of only one member, as ab, aab, &c.

MONOPETALOUS, in botany, a term applied to flowers that have only one petal, or flower-leaf.

MONOPOLY, one or more perſons making themſelves the ſole maſters of the whole of a commodity, manufacture, and the like, in order to make private advantage of it, by ſelling it again at a very advanced price.

MONOPTERE, in architecture, a kind of temple, round, and without walls, having a dome ſupported by columns.

MONOPTOTON, in grammar, a noun that has only one caſe, as *inficias*.

MONOPYRENEOUS, in botany, ſuch fruit as contains only one ſeed, or kernel.

MONORHYME, a piece of poetry, in which all the verſes end with the ſame rhyme.

MONOSTICH, an epigram that conſiſts of only one ſingle verſe.

MONOSYLLABLE, in grammar, a word that conſiſts of only one ſyllable, and is compoſed of either one or more letters pronounced at the ſame time.

MONOTHELITES, a ſect of Chriſtians in the ſeventh century, ſo called from their maintaining, that though there were two natures in Jeſus Chriſt, the human and divine, there was but one will, which was the divine.

MONOTONY, an uniformity of ſound, or a fault in pronunciation, when a long ſeries of words are delivered in one unvaried tone.

MONOTROPA, in botany, a genus of plants, the flower of which conſiſts of ten oblong deciduous petals, ſerrated at the tops: the fruit is an oval, pentagonal, obtuſe capſule, containing a great number of paleaceous ſeeds.

This genus comprehends the orobanchoides of Tournefoit, and the hypopitys of Dillenius.

MONSOON, in phyſiology, a ſpecies of trade-wind, in the Eaſt-Indies, which for ſix months blows conſtantly the ſame way, and contrary the other ſix. See WIND.

MONTH, *Menſis*, in chronology, the twelfth part of a year.

Time being duration, marked out for certain uſes, and meaſured by the motion of the heavenly bodies, there thence reſults divers kinds of months as well as years different from one another according to the particular luminary by whoſe revolution they are determined, and the particular purpoſes they are deſtined for: hence months are of two kinds, aſtronomical and civil.

An aſtronomical month is that which is governed either by the motion of the ſun or moon, and is conſequently of two kinds, ſolar and lunar: a ſolar month is that time, in which the ſun ſeems to run through a whole ſign, or, the twelfth part of the ecliptic.

Hence, if regard be had to the ſun's true apparent motion, the ſolar month will be unequal, ſince the ſun is longer in paſſing through the winter-ſigns than through thoſe of the ſummer; but as he conſtantly travels through all the twelve ſigns in 365 days, 5 hours and 49 minutes the quantity of a mean month will be had, by dividing that number by 12; on this principle, the quantity of a ſolar month will be found to be 30 days, 10 hours, 29 minutes, 5 ſeconds. See EARTH.

A lunar month is that ſpace of time which the moon takes up in performing its courſe through the zodiac, or that meaſured by the motion of the moon round the earth; and is of three kinds, *viz.* periodical, ſynodical, and that of illumination. The lunar periodical month, is the ſpace of time wherein the moon makes her round through the zodiac, or wherein ſhe returns to the ſame point, being 27 days, 7 hours, 43 minutes, 5 ſeconds. See the article MOON.

The lunar ſynodical month, called alſo abſolutely the lunar month and lunation, is the ſpace of time between two conjunctions of the moon with the ſun; or the time it takes from one conjunction with the ſun to the next; or from one new moon to another: the quantity of a ſynodical month is 29 days, 12 hours, 44 minutes, 3 ſeconds, and 11 thirds. The quantity of a ſynodical month is not the ſame at all times, for in the ſummer ſolſtice, when the ſun ſeems to move ſloweſt, the ſynodical month appeareth leſs, being about 29 days, 6 hours, 42 minutes; but in the winter, when the ſun's motion ſeems faſter, the moon does not fetch up the ſun ſo ſoon, for which reaſon the ſynodical month then ſeems greater, *viz.* 29 days, 19 hours, and 37 minutes, according to the obſervation of the ſame aſtronomers: ſo that the firſt quantity given of the ſynodical month, is to be underſtood as to the mean motion. From what has been ſaid, it may eaſily appear that the difference between a periodical and ſynodical month is this: the firſt is called periodical in reſpect of the moon's orbit; but the ſynodical is ſo called in reſpect of its connection with the other luminery.

Now after the time of its conjunction, the ſun does not continue in the ſame place of the zodiac, but moves forwards to the eaſt, upon which it falls out that the moon, finiſhing its courſe does not find the ſun again in the ſame place where it left him, he being removed almoſt a whole ſign from his former place, ſo that to overtake the ſun again, it plainly appears that a certain ſpace of time is requiſite beſides the periodical, which makes up the ſynodical month.

The ancient Romans made uſe of the lunar months, and made them alternately of 29 and 30 days; and they marked the days of each month by three terms, *viz.* calends, nones, and ides. See the articles CALENDS, &c.

The lunar month of illumination, or appoſition, or illuminative month, is the ſpace from the firſt time of the moon's appearance after new moon, to her firſt appearance after the new moon following. The lunar month of illumination, is not of any determined quantity, becauſe the moon appears ſometimes ſooner, and ſomtimes later, after the conjunction; for which diverſity aſtronomers give us ſeveral reaſons, particularly the obliquity of the zodiaz, the variable latitude of the moon, the apparent inequality of its motion, the different qualities of the ſummer and winter-air, &c. By this month, however, the Turks and Arabs go; and it is ſaid that the antient Britons went by the phaſes of the moon.

A civil or political month, conſiſts of a certain number of days, according to the laws and cuſtoms of the different countries wherein it is uſed, either having no regard to the ſolar or lunar months, as thoſe of the Egyptians in their equal year, of the Ro-

Romans in the year of Romulus, &c. or coming pretty near to the ſolar aſtronomical month, as the Julian; or elſe the lunar aſtronomical, as the Jewiſh, Turkiſh, and others. The Britiſh, and moſt European nations, make 12 months in the year, viz. January, February, &c.

Civil ſolar months, are ſuch civil months as are accommodated to the aſtronomical months, or thoſe which are to conſiſt alternately of 30 and 31 days, excepting one month of the twelve, which, for every fourth year, conſiſted of 30 days, and for the other years of 29. This form of civil months was introduced by Julius Cæſar; but under Auguſtus, the ſixth month, till then, from its place, called Sextilis, was denominated Auguſtus, in honour of that prince; and to make the compliment yet the greater, a day was added to it, ſo that now it conſiſts of 31 days, though till then it had only 30; to make up for which, a day was taken from February, ſo that from thenceforward it only conſiſted of 28 days, and every fourth year of 29; though before it had ordinarily conſiſted of 29 days, *&c.* and ſuch are the civil or calendar months which now obtain throughout Europe.

Civil lunar months are to conſiſt alternately of 29 and 30 days: thus will two civil months be equal to two aſtronomical ones, abating for the odd minutes, and conſequently the new moon will be hereby kept to the firſt day of each ſuch civil month, for a long time together. However, to make them keep conſtantly pace with the civil months, at the end of each 948 months, a month of 29 days muſt be added; or elſe, every 33d month muſt conſiſt of 30 days. This was the month in civil or common uſe among the Jews, Greeks, and Romans, till the time of Julius Cæſar.

Philoſophical Month, among chemiſts, is the ſpace of 40 days and nights.

MONTIA, blinks, in the Linnean ſyſtem of botany, a genus of the triandria-tryginia claſs of plants, the corolla whereof conſiſts of a ſingle petal, and is divided at the extremity into five parts; three of the ſegments are ſmaller than the others, and produce ſtamina; theſe ſtand alternately with the two larger: the fruit is a turbinated obtuſe capſule, covered by the cup, compoſed of three valves, and having three cells: the ſeeds are three in number, and roundiſh.

MONUMENT, in architecture, a building deſtined to preſerve the memory, &c. of the perſon who raiſed it, or for whom it was raiſed; ſuch are a triumphal arch, a mauſoleum, a pyramid, &c.

MOOD, or Mode, called alſo ſyllogiſtic mood, a proper diſpoſition of the ſeveral propoſitions of a ſyllogiſm, in reſpect of quantity and quality.

Mood, or Mode, in grammar, the different manner of conjugating verbs, ſerving to denote the different affections of the mind.

Hence ariſe four moods, viz. the indicative, ſubjunctive, and imperative: of theſe, the three firſt are called finite moods, becauſe they define a certain perſon and number; but the fourth is called the infinitive, becauſe in it there is no diſtinction of either perſon or number.

MOON, *Luna*, ☽, in aſtronomy, a ſatellite, or ſecondary planet, always attendant on our earth.

Of the ſix primary planets, we find but three that are certainly attended with moons, viz. the earth, Jupiter, and Saturn; for though Mr. Short has given an account of a phænomenon that he obſerved ſome years ago, which ſeems extremely like a moon about Venus, yet, as it was never obſerved before nor ſince, through the beſt of teleſcopes, it does not appear to be a moon. See Jupiter, Earth, and Saturn.

Aſtronomers have drawn the face of the moon, according as it is ſeen with the beſt teleſcopes; for which we are obliged to the accurate labours of the famous ſelenographers Florentius, Langrenus, John Hevelius of Dantzic, Grimaldus and Ricciolus, Italians; who have taken particular care to note all the ſhining parts of the moon's face, and, for the better diſtinguiſhing them, they have given to each part a proper name. Langrenus and Ricciolus have divided the lunar regions among the philoſophers and aſtronomers, and other eminent men; but Hevelius, fearing leſt the philoſophers ſhould quarrel about the diviſions of the lands, has ſpoiled them of this their property, and given the parts of the moon thoſe geographical names that belong to the different iſlands, countries, and ſeas, that belong to our earth, without any regard to their ſituation or figure.

That the ſurface of the moon is not ſmooth or even, but diverſified with hills and vales, continents and ſeas, lakes, &c. any one would imagine, who views her face through a large teleſcope. That ſhe has variety of hills and mountains is demonſtrable from the line which bounds the light and dark parts not being an even and regular curve, as it would be upon a ſmooth ſpherical ſurface, but an irregular broken line, full of dents and notches.

Alſo becauſe ſome ſmall (and many large) bright ſpots appear in the dark portion, ſtanding out at ſeveral diſtances from the boundary line; which ſpots in a few hours become larger, and at laſt unite with the enlightened portion of the diſk.

On the other hand, we obſerve many ſmall ſpots interſperſed all over the bright part, ſome of which have their dark ſides next the ſun, and their oppoſite ſides very bright and circular, which infallibly proves them to be deep, hollow, round cavities; of which there are two very remarkable ones near together on the upper part, and may be viewed exceedingly plain, when the moon is about four or five days old. The depth of theſe lunar cavities prodigiouſly exceeds the height of the mountains, and conſequently the ſurface of the moon has but little reſemblance to that of the earth in theſe reſpects.

Since, then, the moon's ſurface appears to be ſo very mountainous and irregular, it has been a queſtion, how it comes to paſs that the bright circular limb of the diſk does not appear jagged and irregular, as well as the curve bounding the light and dark parts: in anſwer to this, it muſt be conſidered that, if the ſurface of the moon had but one row of mountains placed round the limb of the diſk, the ſaid bright limb would then appear irregularly indented; but ſince the ſurface is all over mountainous, and ſince the viſible limb is to be conſidered not as a ſingle curve line, but a large zone, having many mountains one behind another, from the obſerver's eye, it is evident the mountains in ſome rows being oppoſite to the vales in others, will fill up the inequalities in the viſible limb in the remoter parts, which diminiſh to the ſight and blend with each other, ſo as to conſtitute, like the waves of the ſea, one uniform and even horizon. Whether there be ſeas, lakes, &c in the moon, has been a queſtion long debated, but now concluded in the negative: for in thoſe large, darker regions, which were thought to be ſeas, we view, through a good teleſcope, many permanent bright ſpots, as alſo caverns and empty pits, whoſe ſhadows fall within them, which can never be ſeen in ſeas or any liquid ſubſtance. Their dark and duſky colour may proceed from a kind of matter or ſoil, which reflects light leſs than that of the other regions. Theſe ſpots have continued always the ſame unchangeably, ſince they were firſt viewed with a teleſcope; though leſs alterations than what happen in the earth, in every ſeaſon of the year, by verdure, ſnow, inundations, and the like, would have cauſed a change in their appearance. But indeed as there are no ſeas nor rivers in the moon, and no atmoſphere, ſo of courſe there can be no clouds, rain, ſnow, or other meteors, whence ſuch changes might be expected.

Sir Iſaac Newton mentions an atmoſphere about the moon, but other aſtronomers think there is reaſon (not to ſay a demonſtration) for the contrary: for where there an atmoſphere of air like ours, it muſt neceſſarily obſcure the fixed ſtars in the moon's appulſe to them: but it has been obſerved that this never happens: on the contrary, they preſerve all their ſplendor to the moment of their occultation, and then diſappear inſtantaneouſly, and in the ſame manner they recover their light, when they appear again on the other ſide.

The diſtance of our moon from the earth is determined by her horizontal parallax, or the angle which the ſemidiameter of the earth ſubtends at the moon, viz. the angle A O C (Plate LXXII. *fig.* 1.) which is the difference between the true place of the moon's center O, when in the horizon, and the apparent place thereof, as viewed from the ſurface of the earth at A. The former is known by aſtronomical tables, the latter by obſervation: and the quantity of this difference, or angle, at a mean, is 57′ 12″ = A O C.

If therefore we ſay, as the tangent of 57′ 12′ is to radius, ſo is A C = 1 to C O = 60,1; this will be the mean diſtance of the moon in ſemidiameters of the earth. Therefore, ſince one ſemidiameter of the earth contains 3982 miles, we have 3982×60,1 = 239318,2 = C O, the mean diſtance of the moon.

The moon's apparent ſemidiameter M O meaſures, at her mean diſtance, 15 38″ = 938″ by the micrometer, which is the quantity of the angle M C O. The earth's diameter, therefore, is to the moon's, as 3432″ to 938; that is, as 109 to 30, or, as 3,63 to 1. Wherefore $\frac{30}{109} \times 7964 = 2192$ miles the moon's diameter.

Therefore the face of the earth, as it appears to the lunarians, is to the face of the moon, as it appears to us, as 109×109 to 30×30, *viz.* as 11881 to 900, or as 12,2 to 1. And the real bulk of the earth is to that of the moon as 109×109×109 to 30×30×30, viz. as 1295029 to 27000, that is, as 1295 to 27, or as 48 to 1 very nearly.

Since, as we have ſhewn, the mean diſtance of the moon is about 60 ſemidiameters of the earth, at the diſtance of the moon one degree of the earth's ſurface will ſubtend an angle of one minute, and will therefore be viſible; but ſuch a degree is equal to $69\frac{1}{2}$ miles; therefore a ſpot or place 70 miles in diameter, in the moon, will be juſt viſible to the naked eye. Hence a teleſcope that magnifies about 100 times, will juſt diſcover a ſpot whoſe diameter is $\frac{1}{100}$ of 70 miles, or $\frac{7}{10}$ of a mile of 3698 feet: and a teleſcope that will magnify 1000 times, will ſhew an object that is but $\frac{7}{100}$ of a mile, that is, whoſe diameter is but 370 feet, or little more than 120 yards; and therefore will eaſily ſhew a ſmall town or village, or even a gentleman's ſeat, if any ſuch there be.

The time which the moon takes up in making one revolution about the earth, from a fixed ſtar to the ſame again, is 27d. 7 h. 43′, which is called the periodical month. But the time that paſſes between two conjunctions, that is, from one new moon to another, is equal to 29d. 12h. 44′ 3″, which is called a ſynodical month: for, after one revolution is finiſhed, the moon has a ſmall arch to deſcribe to get between the ſun and the earth, becauſe the ſun keeps advancing forward in the ecliptic. Now this ſurplus of motion takes up 2 d. 5 h. 1′ 3″, which added to the periodical month, makes the ſynodical, according to the mean motions.

The moon moves about its own axis in the ſame time that it moves about the earth, from whence it comes to paſs that ſhe always ſhews the ſame face to us: for by this motion about her axis, juſt ſo much of her ſurface is turned towards us conſtantly, as by her motion about the earth would be turned from us.

But ſince this motion about the axis is equable and uniform, and that about the earth, or common center of gravity, is unequal and irregular, as being performed in an ellipſis, it muſt follow that the ſame part of the moon's ſurface, preciſely, can never be ſhewn conſtantly to the earth ; and this is confirmed by the teleſcope, through which we often obſerve a little gore or ſegment on the eaſtern and weſtern limb appear and diſappear by turns, as if her body librated to and fro ; which therefore occaſioned this phænomenon to be called the moon's libration. The orbit of the moon is elliptical, more ſo than any of the planets, and is perpetually changing and variable, both in reſpect of its figure and ſituation ; of which we ſhall treat more largely further on. The inclination of the moon's orbit to the plane of the ecliptic is alſo variable, from 5° to 5° 18′. The line of the nodes likewiſe has a variable motion from eaſt to weſt, contrary to the order of the ſigns, and completes an entire revolution in a ſpace of time a little leſs than nineteen years. Alſo the line of the apſides, or of the apogee and perigee, has a direct motion from weſt to eaſt, and finiſhes a revolution in the ſpace of about nineteen years. All which will be more copiouſly treated of, when we come to explain the phyſical cauſes thereof.

The phaſes of the moon in every part of the orbit, are eaſily accounted for from her different ſituation with reſpect to the earth and ſun : for, tho' to an eye placed in the ſun ſhe will always exhibit a complete illuminated hemiſphere, yet in reſpect to the earth, where the hemiſphere is viewed in all degrees of obliquity, it will appear in every degree from the greateſt to the leaſt ; ſo that at E (*fig.* 2 and 3.) no part at all of the enlightened ſurface can be ſeen. At D, a little part of it is turned towards the earth, and from its figure it is then ſaid to be horned. At C, one half of the enlightened ſurface is turned to the earth, and ſhe is then ſaid to be dichotomiſed, and in her firſt quarter or quadrature. At B, a part more than half is turned to the earth, and then ſhe is ſaid to be gibbous. At A, her whole illuminated hemiſphere is ſeen, being then in oppoſition to the ſun ; and this is called the full moon. At H, ſhe is again gibbous, but on the other part : at G ſhe is again dichotomiſed, and in her laſt quarter : at F ſhe is horned, as before ; and then becomes new again at E, where ſhe is in conjunction with the ſun.

If M N be drawn perpendicular to the line S L joining the centers of the ſun and moon, and O P perpendicular to the line T L joining the centers of the earth and moon, it is evident that the angle P L N in the firſt half of the orbit, and O L M in the ſecond, will be proportional to the quantity of the illuminated diſk turned towards the earth ; and this angle is every where equal to the angle E T L, which is called the elongation of the moon from the ſun.

To find what quantity of the moon's viſible ſurface is illuſtrated for any given time, we are to conſider that the circle of illumination B F C, (*fig.* 4.) is oblique to the view every where, but at E and A ; and therefore by the laws of the orthographic projection, it will be projected into an ellipſe whoſe longeſt axis is the diameter of the moon B C, and the ſemi-conjugate is F L = coſine of the angle of elongation F B P. Hence F P = verſed ſine of the ſaid angle. But from the nature of the circle and ellipſe, we have L P in a conſtant ratio to F P, wherever the line O P is drawn perpendicular to B ; therefore alſo 2 L P = P O has a conſtant ratio to F P. But (by Euclid V. 12.) the ſum of all the lines O P = area of the circle is to the ſum of all the lines F P = area of the illuminated part, as the diameter of the circle O P to the verſed ſine of the elongation F P.

As the moon illuminates the earth by a reflex light, ſo does the earth the moon ; but the other phænomena will be different for the moſt part. 1. The earth will be viſible but to little more than one half of the lunar inhabitants. 2. To thoſe who ſee it, the earth appears fixed, or at leaſt to have no circular motion, but only that which reſults from the moon's libration. 3. Thoſe who live in the middle of the moon's viſible hemiſphere, ſee the earth directly over their heads. 4. To thoſe who live in the extremity of that hemiſphere, the earth ſeems always nearly in the horizon, but not exactly there, by reaſon of the libration. 5. The earth, in the circle of a month, would have all the ſame phaſes as the moon has. Thus the lunarians, when the moon is at E, in the middle of their night, ſee the earth at full, or ſhining with a full face ; at C and G it is dichotomiſed, or half light and half dark ; at A it is wholly dark, or new ; and at the parts between theſe it is gibbous. 6. The earth appears variegated with ſpots of different magnitudes and colours, ariſing from the continents, iſlands, oceans, ſeas, clouds, &c. 7. Theſe ſpots will appear conſtantly revolving about the earth's axis, by which the lunarians will determine the earth's diurnal rotation, in the ſame manner as we do that of the ſun.

MOOR, in country affairs, denotes an unlimited tract of land, uſually over-run with heath.

MOOR-BUZZARD, the Engliſh name of the yellow-legged falcon, with an iron-coloured body and yellow head.

It is about the ſize of the common crow, and has its Engliſh name from building its neſt in mooriſh and boggy places.

MOOR-COCK, or **GOR-COCK**, a ſpecies of tetrao, with a forked tail, ſpotted with white underneath. It is a native of England, but very rare :

the male is throughout of a very deep iron grey, without any variegation; and the female is likewiſe grey, but variegated with tranſverſe lines of black.

MOORING, or Moaring, in the ſea language, is the laying out the anchors of a ſhip in a place where ſhe can ride ſecure.

Mooring acroſs, is laying out an anchor on each ſide: and mooring along, is to have an anchor in a river, and a hawſer on ſhore.

When ſhips are laid up in ordinary, or are under orders of fitting for the ſea, the moorings are laid out in harbours; and conſiſt of claws, pendant chains, cables, bridles, anchors, ſwivels, jews-harps, buoys, and chains.

MOOT, a difficult caſe argued by the young barriſters and ſtudents at the inns of court, by way of exerciſe, the better to qualify them for practice, and to defend the cauſes of their clients.

MORAL, ſomething belonging to manners, or the conduct of life.

Moral Philosophy, the ſame with ethics. See Ethics.

Moral Sense, that whereby we perceive what is good, virtuous, and beautiful in actions, manners, and characters.

MORALITY, the ſcience and doctrine of morals, otherwiſe called ethics. See Ethics.

MORASSE, a low, moiſt land, which receives the waters from the higher grounds without having any deſcent to carry them off.

MORBID, among phyſicians, ſignifies diſeaſed or corrupt; a term applied either to an unſound conſtitution, or to to thoſe parts or humours that are infected by a diſeaſe.

MORBILLI, the meaſles, in medicine. See Measles.

MORESK, or Morisco, is a kind of painting, carving, &c. done after the manner of the moors; conſiſting of ſeveral groteſque pieces and compartments, promiſcuouſly mingled, not containing any perfect figure of a man, or other animal; but a wild reſemblance of birds, beaſts, trees, &c.

Moresk-Dances, vulgarly called morrice-dances, are thoſe altogether in imitation of the moors, as ſarabands, chacons, &c. which are generally performed with caſtenets or tambours.

MORINA, in botany, a plant of the diandria-monogynia claſs, with a monopetalous flower, bilabiated at the limb: the ſeed is ſingle, roundiſh, and coronated with the cup of the flower.

MORINDA, in botany, a genus of the pentandria monogynia claſs of plants, with an infundibuliform monopetalous flower, divided into five ſegments at the limb: the fruit is a roundiſh berry, with an umbilicated point, and contains two elliptico-hemiſpherical ſeeds.

MORISONA, in botany, a genus of plants, the flower of which conſiſts of four oblong petals: the fruit is a globoſe berry, containing a great many kidney ſhaped ſeeds.

MORNING, the beginning of the day, the firſt appearance of light, or the time from midnight till noon.

MOROCCO, *Marroquin*, in commerce, a fine kind of leather, prepared of the ſkin of an animal of the goat kind, and impotted from the Levant, Barbary, &c.

MORPHEW, a leprous kind of ſcurf, which ſometimes breaks out upon the ſkin, particularly about the forehead. See Leprosy.

MORSE, in zoology, a name by which ſome call the hippopotamus. See the article Hippopotamus.

MORTALITY, or *Bills of* Mortality, properly denote weekly liſts of the perſons who die in any place.

In London, theſe bills are drawn up by the company of pariſh clerks, and contain an account of the numbers, ages, diſeaſes, &c. of ſuch as die within the bills of mortallity; that is, in London, Weſtminſter, and ten miles round.

The great diſparity between the births and burials in London, is owing to this, that the diſenters of all ſorts, baptize their children without ſending an account of them to the pariſh clerks; ſo that little dependence is to be had on theſe, with regard to calculating annuities for life.

MORTAR, a preparation of lime and ſand, mixed up with water, which ſerves as a cement, and is uſed by maſons and bricklayers, in building of walls of ſtone and brick.

Mortar-Piece, a ſhort piece of ordnance, conſiderably thick and wide; ſerving to throw bombs, carcaſſes, fire-pots, &c.

MORTGAGE, in law, a pledge or pawn of lands, tenements, &c. for money borrowed; ſo called, becauſe if the money is not paid at that day, the land dies to the debtor, and is forfeited to the creditor.

The common method of making a mortgage, is by leaſe for a long term of years, wherein a pepper-corn rent has been uſually reſerved: or it may be made by aſſignment for a term, and by leaſe and releaſe. The creditor, who holds the eſtate according to the condition of the deed, is called the mortgagee; but the mortgager, who is the perſon that makes the mortgage, generally keeps poſſeſſion of the land till failure is made in the payment of the mortgage-money; in which caſe, though the mortgagee enters for non-payment, the mortgager has a right to the equity of redemption in the court of chancery, where he may call the mortgagee to an account for the profits of the land mortgaged.

MORTIFICATION, in medicine, the ſame with ſphacelus. See Sphacelus.

MORTISE, or Mortoise, in carpentry, &c.

a kind of joint, wherein a hole of a certain depth is made in a piece of timber, which is to receive another piece called a tenon.

MORTMAIN, in law, is the alienation of lands or tenements to any religious houſe, corporation, or fraternity, and their ſucceſſors.

MORTUARY, in the eccleſiaſtical law, is a gift left by a man at his death to his pariſh church, in recompence of perſonal tythes omitted to be paid in his life time: or it is that beaſt, or other cattle, which, after the death of the owner, by the cuſtom of the place, is due to the parſon or vicar, in lieu of tythes or offerings forgot, or not well and truly paid by him that is dead.

MORUS, the mulberry-tree, in botany. See MULBERRY.

MOSAIC, or MOSAIC-WORK, an aſſemblage of little pieces of glaſs, marble, precious ſtones, &c. of various colours, cut ſquare, and cemented on a ground of ſtucco, in ſuch a manner as to imitate the colours and degradations of painting.

MOSCHUS, the muſk-animal, a genus of quadrupeds of the order of the pecora, having no horns; the canine teeth of the upper jaw are exerted.

Of this genus there is only one known ſpecies, which is the animal that produces the perfume, from which it is named. See MUSK.

This creature, when full grown, is three feet in length, from the tip of the noſe to the rump; the head is oblong, and the anterior part much like the greyhound; the ears are large and erect, they reſemble thoſe of the rabbit, and are equal in length to the diameter of the forehead; the tail is not more than two inches in length, and the creature always carries it erect; the body is tolerably fleſhy, and rounded; the legs about a foot in length, and very robuſt; the feet deeply divided, each into two claws in the anterior part, and as many heels behind. The fur on the head and that on the legs is about half an inch long, that on the belly is an inch and a half, and that which grows on the back three inches; theſe hairs are thicker than in any other known animal, and are variegated, from the baſe to the extremity, with diſtinct ſpaces of brown and white: the veſſel or bag in which the perfume (called muſk) is contained, is three inches long and two broad, and hangs under the belly, protuberating near three quarters of an inch beyond the ſurface.

MOSQUE, a temple, or place of religious worſhip, among the mahometans.

All moſques are ſquare buildings, generally built with ſtone; before the chief gate there is a ſquare court, paved with white marble, and low galleries round it, whoſe roof is ſupported by marble pillars. In theſe galleries the Turks waſh themſelves before they go into the moſque. In each moſque there is a great number of lamps; and between theſe, hang many cryſtal rings, oſtriches eggs, and other curioſities, which, when the lamps are lighted, make a fine ſhew.

As it is not lawful to enter the moſques with ſhoes or ſtockings on, the pavements are covered with pieces of ſtuff ſewed together, each being wide enough to hold a row of men kneeling, ſitting, or proſtrate. The women are not allowed to enter the moſque, but ſtay in the porches without. About every moſque there are ſix high towers, called minarets, each of which has three little open galleries, one above another: theſe towers, as well as the moſques, are covered with lead, and adorned with gilding and other ornaments; and from thence, inſtead of a bell, the people are called to prayer by certain officers appointed for that purpoſe.

Moſt of the moſques have a kind of hoſpital belonging to them, in which travellers, of what religion ſoever, are entertained during three days. Each moſque has alſo a place called Tarbé, which is the burying-place of its founders; within which is a tomb, ſix or ſeven feet long, covered with green velvet or ſattin, at the ends of which are two tapers, and round it ſeveral ſeats for thoſe who read the koran, and pray for the ſouls of the deceaſed.

MOSS, *Muſcus*, in botany, a very numerous order of plants, belonging to the cryptogamia claſs, the fructification of which is but little underſtood.

Linnæus, indeed, has attempted to arrange them according to what he takes to be the parts of generation, many of which he acknowledges to be wanting. Hence in the deſcription of ſuch imperfect plants, it becomes neceſſary to diſtinguiſh them according to their general habit and ſtructure.

Moſſes, therefore, may be arranged under the following ſubdiviſions, 1. Such as conſiſt of tender flexible filaments, as byſſus and conferva. 2. Such as conſiſt of a mere foliaceous or gelatinous matter, as phyllona, ulva, &c. 3. Such as conſiſt of firm and ſomewhat rigid ſtalks, as uſnea, platyſma, &c. 4. Such as conſiſt merely of a dry, cruſtaceous, or elſe of a gelatinous matter, as placodium. 5. Such as produce capſules, covered with opercula, as bryum, polytrichum, ſphagnum, mnium, &c. 6. Such as produce capſules without pedicles, and without calyptræ, as lycopodium, triſpermium, ſelago, &c. 7. Such as conſiſt of foliaceous matter, with evident fructifications ariſing from it, as marchantia, jungermannia, anthoceros, &c. See BYSSUS, CONFERVA, &c.

Moſſes are of conſiderable uſe in medicine; uſnea is eſteemed a good deſiccative and aſtringent; the cup moſs is recommended in the chin-cough; the grey ground-lichen, or liverwort, againſt the bite of a mad-dog; and other ſpecies, in other diſorders, as mentioned under their reſpective heads.

Moſs is frequently very injurious to fruit-trees, which grow upon cold barren ſoils, or where they are ſo cloſe planted as to exclude the free acceſs of the air: the only remedy, in ſuch caſes, is to cut down part of the trees, and to plough up the ground between thoſe left remaining; and in the ſpring-ſeaſon, in moiſt weather, you ſhould, with an iron inſtrument made a little hollow, the better to ſurround the branches of the trees, ſcrape off the moſs, carrying it off the place; and by two or three times thus cleanſing them, together with carefully ſtirring the ground, it may be entirely deſtroyed from the trees; but unleſs part of the trees were cut down, and the ground be well ſtirred, the rubbiſh of the moſs will ſignify little.

If the trees are covered with moſs, on account of the dryneſs of the ground, the proper remedy is to lay mud, from the bottom of a river, pretty thick about their roots.

Moss, a name given to boggy grounds in many parts of England.

Theſe conſiſt of a turfy ſurface, below which is a black, moiſt, ſpongy earth, which being dug up with ſpades, ſomewhat in the form of bricks, and dried, is what they call peats, uſed as fuel in ſeveral parts, and the upper ſcurf being cut and dried, makes turfs, another coarſer ſort of fuel.

Wall-Moss, *Bryum*, in botany. See the article Bryum.

MOSTRA, in the Italian muſic, a mark at the end of a line or ſpace, to ſhew that the firſt note of the next line is in that place; and if this note be accompanied with a ſharp or flat, it is proper to place theſe characters along with the moſtra.

MOTAZALITES, the name of a famous ſect among the mahometans, properly ſignifying ſeparatiſts.

The motazalites are not accounted orthodox muſſulmen, as they believe the alkoran to be created and not eternal; and beſides aſſert, that there are no attributes in God diſtinct from his eſſence.

MOTE, in law-books, ſignifies court or convention, as a ward-mote, burgh-mote, ſwain-mote, &c. See the articles Ward-Mote, &c.

MONETTO, in the Italian muſic, a ſort of church-muſic, compoſed with much art and ingenuity, from one to eight parts, with or without inſtruments, and uſually acompanied with a thorough baſs.

MOTH, *Tinea*, or *Phalæna*, in zoology. See Phalæna.

MOTION, is defined to be the continued and ſucceſſive change of place. See Communication *of Motion*.

There are three general laws of motion. 1. That a body always perſeveres in its ſtate of reſt, or of uniform motion in a right line, till by ſome external force it be made to change its ſtate: for as body is paſſive in receiving its motion, and the direction of its motion, ſo it retains them, or perſeveres in them without any change, till it be acted on by ſomething external. From this law it appears, why we inquire not, in philoſophy, concerning the cauſe of the continuation of motion or reſt in bodies, which can be no other than their inertia: but if a motion begin, or if a motion already produced is either accelerated or retarded, or if the direction of the motion is altered, an inquiry into the power or cauſe that produces this change is a proper ſubject of philoſophy. 2. The ſecond general law of motion is, that the change of motion is proportional to the force impreſſed, and is produced in the right line in which that force acts. When a fluid acts upon a body, as water or air upon the vanes of a mill, or wind upon the ſails of a ſhip, the acceleration of the motion is not proportional to the whole force of thoſe fluids, but to that part only which is impreſſed upon the vanes or ſails, which depends upon the exceſs of the velocity of the fluid above the velocity which the vane or ſail has already acquired; for if the velocity of the fluid be only equal to that of the vane or ſail, it juſt keeps up with it, but has no effect either to advance or retard its motion, Regard muſt always be had to the direction in which the force is impreſſed, in order to determine the change of motion produced by it: thus, when the wind acts obliquely with reſpect to the direction of a ſhip, the change of her motion is firſt to be eſtimated in the direction of the force impreſſed; and thence, by a proper application of mechanical and geometrical principles, the change of the motion of the ſhip in her own direction is to be deduced. 3. The third general law of motion is, that action and re-action are equal, with oppoſite directions, and are to be eſtimated always in the ſame right line. Body not only never changes its ſtate of itſelf, but reſiſts by its inertia every action that produces a change in its motion: hence when two bodies meet, each endeavours to perſevere in its ſtate, and reſiſts any change; the one acquires no new motion, but what the other loſes in the ſame direction; nor does this laſt loſe any force, but what the other acquires; and hence, though by their colliſion, motion paſſes from the one to the other, yet the ſum of their motions, eſtimated in a given direction, is preſerved the ſame, and is unalterable by their mutual actions upon each other.

All motion may be conſidered abſolutely or relatively. Abſolute or real motion, ſays Mr. Maclaurin, is when a body changes its place in abſolute ſpace; and relative motion, is when a body changes its place only with relation to other bodies.

From the obſervation of nature, every one knows that there is motion; that a body in motion perſeveres in that ſtate, till by the action of ſome power it is neceſſitated to change it; that it is not in relative or apparent motion in which it perſeveres, in conſequence of its inertia, but in real or abſolute motion. Thus the apparent diurnal motion of the ſun and ſtars would ceaſe, without the leaſt power or force acting upon them, if the motion of the earth was ſtopped; and if the apparent motion of any ſtar was deſtroyed by a contrary motion impreſſed upon it, the other celeſtial bodies would ſtill appear to perſevere in their courſe. See the article INERTIA.

To make this matter ſtill plainer, Mr. Martin obſerves, that ſpace is nothing but an abſolute and infinite void, and that the place of a body is that part of the immenſe void which it takes up or poſſeſſes: and this place may be conſidered abſolutely, or in itſelf, in which caſe it is called the abſolute place of the body; or elſe with regard to the place of ſome other body, and then it is called the relative or apparent place of the body.

Now as a motion is only the change of place in bodies, it is evident that it will come under the ſame diſtinction of abſolute and relative or apparent. All motion is in itſelf abſolute, or the change of abſolute ſpace; but, when the motions of bodies are conſidered and compared with each other, then are they relative and apparent only: they are relative, as they are compared to each other; and they are apparent only, inſomuch that not their true or abſolute motion, but the ſum or difference of the motions only is perceivable to us.

In comparing the motions of bodies we may conſider them as moving both the ſame way, or towards contrary parts: in the firſt caſe, the difference of motion is only perceived by us; in the latter, the ſum of the motions. Thus, for example, ſuppoſe two ſhips, A and B, ſet ſail from the ſame port upon the ſame rhumb, and that A ſails at the rate of five miles per hour, and B at the rate of three: here the difference of the velocity (viz. two miles per hour) is that by which the ſhip A will appear to go from the ſhip B forwards, or the ſhip B will appear at A to go with the ſame velocity backwards, to a ſpectator in either reſpectively.

If the two ſhips, A and B, move with the ſame degree of velocity, then will the difference be nothing, and ſo neither ſhip will appear to the other to move at all. Hence it is, that though the earth is continually revolving about its axis, yet, as all objects on its ſurface partake of the ſame common motion, they appear not to move at all, but are relatively at reſt.

If two ſhips, A and B, with the degrees of velocity as above, meet each other, the one will appear to the other to move with the ſum of both velocities, viz. at the rate of eight miles per hour; ſo that in this caſe the apparent motion exceeds the true, as in the other it fell ſhort of it. Hence the reaſon why a perſon, riding againſt the wind, finds the force of it much greater than it really is, whereas, if he rides with it, he finds it leſs.

The reaſon of all theſe phænomena of motion will be evident, if we conſider we muſt be abſolutely at reſt, if we would diſcern the true or real motions of bodies about us. Thus a perſon on the ſtrand will obſerve the ſhips ſailing with their real velocity; a perſon ſtanding ſtill will experience the true ſtrength and velocity of the wind; and a perſon, placed in the regions between the planets, will view all their true motions, which he cannot otherwiſe do, becauſe in all other caſes the ſpectator's own motion muſt be added to or ſubtracted from that of the moving body, and the ſum or difference is therefore the apparent or relative motion, and not the true.

Motion is alſo either equable or accelerated.

Equable motion is that by which a body paſſes over equal ſpaces in equal times.

Accelerated motion is that which is continually augmented or increaſed, as retarded motion is that which continually decreaſes; and, if the increaſe or decreaſe of motion be equal in equal times, the motion is then ſaid to be equally accelerated or retarded.

Equable motion is generated by a ſingle impetus or ſtroke; thus the motion of a ball from a cannon is produced by the ſingle action of the powder in the firſt moment, and, therefore, the velocity it firſt ſets out with, would always continue the ſame, were it void of gravity; and to move in an unreſiſting medium; which, therefore, would be always equable, or ſuch as would carry it through the ſame length of ſpace in every equal part of time.

Animal MOTION, is that whereby the ſituation, figure, magnitude, &c. of the parts, &c. of animals are changed: under theſe are compriſed all the animal functions. See the article FUNCTION.

Animal motions are divided into ſpontaneous and natural.

Spontaneous or *muſcular* MOTION, is that performed by the muſcles at the command of the will. See MUSCLE.

Natural or *involuntary* MOTION, that effected, without any ſuch command, by the mere mechaniſm of the parts, ſuch as the motion of the heart, pulſe, &c.

Inteſtine MOTION, the agitation of the particles of which a body conſiſts.

Some philoſophers will have every body, and every particle thereof in continual motion. Hence inteſtine motion is repreſented to be a motion of the internal and ſmaller parts of matter, continually excited by ſome external latent agent, which only diſcovers itſelf by effects, being appointed by nature as the great inſtrument of the changes in bodies.

MOTION, in aſtronomy, peculiarly denotes the orderly courſes of the heavenly bodies.

The motions of the celeſtial luminaries are diurnal or common, and ſecondary or proper.

Diurnal or *primary* MOTION, is that wherein the whole mundane ſphere appears to revolve every day round the earth from eaſt to weſt. See the article DIURNAL.

This is called the motion of the primum mobile, and the common motion, to diſtinguiſh it from that peculiar to each planet, &c.

Secondary or *proper* Motion, is that wherewith a ſtar, planet, &c. advances a certain ſpace every day from weſt towards eaſt. See the article Earth, &c.

Motion, in muſic, the manner of beating the meaſure, to haſten or ſlacken the time of the words or notes. See Time.

Motions, in war, the marches, counter-marches, &c. of an army in changing its poſt.

MOTTO, in armoury, a ſhort ſentence or phraſe carried in a ſcroll, generally under, but ſometimes over the arms; ſometimes alluding to the bearing, ſometimes to the name of the bearer, and ſometimes containing whatever pleaſes the fancy of the diviſer.

MOTU. See the article Ex mero motu.

MOVEABLE, in general, denotes any thing capable of being moved.

The moveable feaſts are ſuch as are not regularly held on the ſame day of the year or month, though they are always on the ſame day of the week. Thus Eaſter, which is that moveable feaſt on which all the reſt depend, is held on the Sunday which falls upon, or next after, the firſt full moon following the 21ſt of March; and all the other feaſts keep a regular and certain diſtance from it; ſuch as Septuageſima, Sexageſima, Aſh-wedneſday, Aſcenſion-day, &c. which ſee under their proper articles.

The moveable terms are Eaſter-term and Trinity-term. See Terms.

Moveable Goods, in law, ſuch chattels as are capable of being removed from one place to another, as cattle, merchandize, &c. See Chattels.

MOVEMENT, in mechanics, a machine that is moved by clockwork; for the theory of which, ſee the articles Clock, Watch, &c.

To make a regular movement, that may ſerve to meaſure time as exactly as poſſible, is one of the moſt valuable problems in mechanics, which has been moſt ſucceſsfully effected, hitherto, by adapting pendulums to clocks: though it muſt be owned, ſays Mr. Maclaurin, that many ingenious contrivances have been invented to correct the irregularities of thoſe movements that go by ſprings.

MOULD, or Mold, in the mechanic arts, &c. a cavity cut with a deſign to give its form or impreſſion to ſome ſofter matter applied therein, of great uſe in ſculpture, foundery, &c.

Moulds, in the manufacture of paper, are little frames compoſed of ſeveral braſs or iron-wires, faſtened together by another wire ſtill finer. Each mould is of the bigneſs of the ſheet of paper to be made, and has a rim or ledge of wood to which the wires are faſtened; theſe moulds are more uſually called frames, or forms.

Furnace and Crucible-makers Moulds, are made of wood, of the ſame form with the crucibles; that is, in form of a truncated cone: they have handles of wood to hold and turn them with, when, being covered with the earth, the workman has a mind to round or flatten his veſſel.

Moulds *for Leaden Bullets*, are little iron pincers, each of whoſe branches terminates in an hemiſpherical concavity, which when ſhut, form an intire ſphere: in the lips or ſides where the branches meet, is a little jet or hole, through which the melted led is conveyed.

Glaziers-Moulds. The glaziers have two kinds of moulds, both ſerving to caſt their lead. In the one they caſt the lead into long rods or canes, fit to be drawn through the vice, and the grooves formed therein: this they ſometimes call ingot-mould. In the other they mould thoſe little pieces of lead a line thick, and two lines broad, faſtened to the iron-bars: theſe may be alſo caſt in the vice.

Goldſmiths-Mould. The goldſmiths uſe the bones of the cuttle-fiſh to make moulds for their ſmall works, which they do by preſſing the pattern between two bones, and leaving a jet or hole to convey the ſilver through, after the pattern has been taken out.

Mould, among maſons, a piece of hard wood or iron hollowed withinſide, anſwering to the contours of the mouldings or corniches, &c. to be framed; this is otherwiſe called caliber.

Moulds, among plumbers, are the tables whereon they caſt the ſheets of lead. Theſe they ſometimes call ſimple tables: beſides which they have other real moulds wherewith they caſt pipes without ſoldering. See Plumbery.

Moulds, among tallow-chandlers, are of two kinds: the firſt for the common dipped candles, being the veſſel wherein the melted tallow is diſpoſed, and the wick dipped: this is of wood, of a triangular form, and ſupported on one of its angles, ſo that it has an opening of near a foot at top: the other, uſed in the fabric of mould candles, is of braſs, pewter, or tin; here each candle has its ſeveral moulds. Ses Candle.

Mould, among gold-beaters, a certain number of leaves of vellom, or pieces of guts, cut ſquare, of a certain ſize, and laid over one another, between which they put the leaves of gold and ſilver, which they beat on the marble with the hammer. They have four kinds of moulds, two whereof are of vellom, and two of gut; the ſmalleſt of thoſe of vellom conſiſts of forty or fifty leaves, the largeſt contains an hundred; for the others, each contains five hundred leaves. The moulds have all their ſeveral caſes, conſiſting of two pieces of parchment, ſerving to keep the leaves of the mould in their place, and prevent their being diſordered in beating.

Mould, in agriculture, a looſe kind of earth, every where obvious on the ſurface of the ground, called alſo natural or mother-earth; by ſome alſo loam. See Earth.

MOULDINESS, a term applied to bodies which corrupt in the air, from ſome hidden principle of humidity therein; and whoſe corruption ſhews itſelf by a certain white down, or lanugo, on their ſurface, which, viewed through a microſcope, appears like a kind of meadow, out of which ariſe herbs and flowers, ſome only in the bud, others full blown, and others decayed, each having its root, ſtalk, and other parts.

MOULDING, any thing caſt in a mould, or that ſeems to have been ſo, though in reality, it were cut with a chiſſel, or the ax.

Moulding, in architecture, projectures beyond the naked wall, column, wainſcot, &c. the aſſemblage of which forms corniches, door-caſes, and other decorations of architecture.

Moulding, in ſhip-building, the juttings or projectures beyond the level of the ſide; they are placed above one another; the intervals of which are generally ornamented with martial inſtruments, trophies of war, marine and other emblematical figures, &c.

MOULINET, in mechanics, is uſed to ſignify a roller, which, being croſſed with two levers, is uſually applied to cranes, capſtans, and other ſorts of engines of the like nature, to draw ropes, and heave up ſtones, &c.

Moulinet is alſo a kind of turnſtile, or wooden croſs, which turns horizontally upon a ſtake fixed in the ground; uſually placed in paſſages to keep out horſes, and to oblige paſſengers to go and come one by one. Theſe moulinets are often ſet near the outworks of fortified places, at the ſides of the barriers, through which people paſs on foot.

MOULTING, or Mewing. See the article Mewing.

MOUND, a term uſed for a bank or rampart, or other fence, particularly that of earth.

Mound, in heraldry, a ball or globe with a croſs upon it, ſuch as our kings are uſually drawn with, holding it in their left hands, as they do the ſceptre in the right.

MOUNT-Egg. In the tin-works, after the tin from the burnt ore is melted down and remelted, there will ſometimes remain a different ſlug in the bottom of the float; this they call mount-egg: and though of a tin colour, yet is of an iron nature, as has been found by applying a magnet to it.

MOUNTAIN, *Mons*, a part of the earth, riſing to a conſiderable height above the level of the ſurface thereof.

Burning-Mountain. See Vulcano.

MOUNTING, in the mechanic arts, ſomething that ſerves to raiſe or ſet off a work: thus, the frame and its dependences make the mounting of a looking-glaſs; the hilt, the mounting of a ſword; the ſuſt, or but, the mounting of a carabine, muſquet, &c. and the mounting of a fan, is the ſticks which ſerve to open and ſhut it.

Mounting, in military affairs, ſignifies going upon duty: thus, mounting a breach, is running up to it; mounting the guard, is going upon guard; and mounting the trenches, is going upon duty in the tranches: but mounting a cannon, mortar, &c. is the ſetting it on its carriage, or the raiſing its mouth.

MOUSE, among ſailors, a ſort of riſing made on the ſtays, and ſome other ropes, in a ſhip, to prevent the eye, in one end of the rope, from ſlipping up above its proper place, or the body of it.

The mouſe, which ſomewhat reſembles a pear, is raiſed by winding tarred canvas, called parſling, about the ſtay in one place, and afterwards a great many turns of ſpun-yarn: the whole is completed by weaving a coat or cover round the mouſe very curiouſly, which is called pointing. See the article Pointing.

Mouse-Ear, *Myoſotis*, in botany. See the article Myosotis.

MOUTH, in anatomy, a part of the face, conſiſting of the lips, the gums, the inſides of the cheeks, the palate, the ſalival glands, the os hyoides, the uvula, and the tonſils; which ſee under their proper articles.

MOXA, a ſort of cotton or downy ſubſtance, ſeparated from the leaves of a ſort of Indian mugwort; uſed by the eaſtern nations for cauterizing in certain parts of the body.

MUCILAGE, in pharmacy, is in general any viſcid and glutinous liquor.

Mucilage alſo denotes a thick pituitous matter, evacuated with the urine, in the gravel and dyſuria.

Mucilage likewiſe imports the liquor which principally ſerves to moiſten the ligaments and cartilages of the articulations; and is ſupplied by the

MUCILAGINOUS Glands, in anatomy, a very numerous ſet of glands, ſerving to ſecrete the mucilage of the joints. See Gland.

MUCOR, in botany, a genus of muſhrooms, being funguſes conſiſting of little roundiſh bladders, in which are found numerous ſeeds, affixed to hair-like receptacles, placed all over the inſide of the bladders.

MUCOUS Glands, in anatomy three glands which empty themſelves into the urethra; ſo called by their firſt diſcoverer, Mr. Cowper, from the tenacity of the liquor which they ſeparate.

MUCRO Cordis, in anatomy, the lower or pointed end of the heart.

MUCUS, a mucilaginous liquor, ſeparated by the mucous glands and the noſtrils.

MUFFLE, in metallurgy, an arched cover, reſiſting the ſtrongeſt fire, and made to be placed over coppels and teſts, in the operations of aſſaying, to preſerve them from the falling of coals and aſhes into them; though, at the ſame time, of ſuch a form, as is no hindrance to the action of the air and fire on the metal, nor to the inſpection of the aſſayer.

The muffles may be made of any form, providing they have theſe conditions: but thoſe uſed with coppels are commonly made ſemi-cylindrical; or when greater veſſels are employed, in form of a hollow hemiſphere. The muffle muſt have holes, that the aſſayer may look in; and the fore-part of it muſt be always quite open, that the air may act better in conjunction with the fire, and be inceſſantly renewed: the apertures in the muffle ſerve alſo for the regimen of the fire, for the cold air ruſhing into the large opening before, cools the bodies in the veſſel; but if ſome coals are put in it, and its aperture before be then ſhut, with a door fitted to it, the fire will be increaſed to the higheſt degree, much more quickly than it can be by the breathing holes of the furnace.

MUFTI, or MUPHTI, the chief of the eccleſiaſtical order, or primate, of the muſſulman religion.

MUGGLETONIANS, a religious ſect, which aroſe in England about the year 1657; ſo denominated from their leader, Lodowick Muggleton, a journeyman taylor, who, with his aſſociate Reeves, ſet up for great prophets; pretending, as it is ſaid, to have an abſolute power of ſaving and damning whom they pleaſed; and giving out, that they were the two laſt witneſſes of God, that ſhould appear before the end of the world.

MUGWORT, *Artemiſia*, in botany. See ARTEMISIA.

MULBERRY-TREE, *Morus*, in botany, a genus of plants of the monoecia-triandria claſs; the male flowers are collected in a long amentum, having no corolla: the ſtamina are four erect ſubulated filaments, longer than the cup, and terminated with ſimple antheræ: the female flowers have no petals; they are collected in round heads, and are ſucceeded by a well-known, large, fleſhy, ſucculent berry, compoſed of ſeveral protuberances, in each of which is placed an oval pointed ſeed.

Of mulberries, there are two kinds, the black and the white; but the black is moſt common with us. They are propagated by ſowing the ſeeds, or by laying down the fruit-bearing branches; but thoſe propagated by ſeeds are commonly moſt vigorous, though they ſeldom prove ſo fruitful as the others. They may alſo be increaſed from cuttings, planted in March.

The ſoil mulberry-trees delight in, is a rich light earth, of a good depth; they ſhould never be planted near other trees or buildings, for then the fruit will not ripen ſo well.

Mulberries have the qualities common to other ſweet fruits, in abating heat and quenching thirſt; they are chiefly eaten for pleaſure, but they yield little nouriſhment.

The leaves of this plant are uſed in France, Italy, Perſia, &c. for feeding ſilk-worms; for which purpoſe, they ſhould never be allowed to grow tall, but kept in a ſort of hedge; and inſtead of pulling off the leaves ſingly, they ſhould be cut off with ſheers, together with the young branches.

MULCT, a fine of money laid upon a man, who has committed ſome fault or miſdemeanor.

MULCH, a term uſed by gardeners for rotten dung, or the like, thrown upon beds of young plants, to preſerve them from the bad effects of cold or drought.

MULE, in zoology, a mongrel kind of quadruped, uſually generated between an aſs and a mare, and ſometimes between a horſe and a ſhe-aſs.

The mule is a ſort of a monſter, of a middle nature between its parents, and therefore incapable of propagating its ſpecies; ſo careful is nature to avoid filling the world with monſters.

Mules are chiefly uſed in countries where there are rocky and ſtony roads, as about the Alps, Pyrenees, &c.

MULLEIN, *Verbaſcum*, in botany. See VERBASCUM.

MULLER, or MULLAR, denotes a ſtone flat and even at the bottom, but round at top, uſed for grinding matters on a marble.

The apothecaries uſe mullers to prepare ſome of their teſtaceous powders, and painters for their colours, either dry or in oil.

MULLER is alſo an inſtrument uſed by the glaſs-grinders; being a piece of wood, to one end whereof is cemented the glaſs to be ground: it is ordinarily about ſix inches long, turned round.

MULLET, *Mugil*, in ichthyology, a genus of the acanthopterygeous fiſhes, the head of which is of a depreſſed form in the anterior part, and the body oblong and compreſſed. On each ſide of the head, below the noſtrils, there ſtands a little bone, which is ſerrated on its lower part: the eyes are not covered with a ſkin: and there are teeth on the tongue and palate, but none in the jaws or fauces: the branchioſtege membrane on each ſide contains ſix oſſicles; theſe are of a crooked figure, and the upper one, which is the broadeſt, is covered by the coverings of the gills in ſuch a manner, that only five appear.

MULLET, or MOLLET, in heraldry, a bearing in form of a ſtar, or rather of the rowel of a ſpur, which it originally repreſented.

The mullet has but five points; when there are ſix, it is called a ſtar; though others make this difference, that the mullet is, or ought to be, always pierced, which a ſtar is not.

The mullet is uſually the difference or diſtinguiſhing

ing mark for the fourth ſon, or third brother, or houſe; though it is often borne alone, as coat-armour.

MULTANGULAR, a figure, or body, which has many angles.

MULTILATERAL, in geometry, is applied to thoſe figures which have more than four ſides or angles, more uſually called polygons. See the article POLYGON.

MULTINOMIAL, or MULTINOMIAL ROOTS, in mathematics, ſuch roots as are compoſed of many names, parts, or members; as $a+b+d+c$, &c. See the article ROOT.

MULTIPLE, *Multiplex*, in arithmetic, a number which comprehends ſome other ſeveral times; thus 6 is a multiple of 2, and 12 is a multiple of 6, 4, and 3, comprehending the firſt twice, the ſecond thrice, &c.

MULTIPLE RATIO, or PROPORTION, is that which is between multiples. If the leſſer term of the ratio be an aliquot part of the greater, the ratio of the greater to the leſs is called multiple; and that of the leſs to the greater ſubmultiple. A ſubmultiple number is that contained in the multiple; thus the numbers 1, 2, and 3, are ſubmultiples of 9. Duple, triple, &c. ratios, as alſo ſubduples, ſubtriples, &c. are ſo many ſpecies of multiple and ſubmultiple ratios. See RATIO.

MULTIPLICAND, in arithmetic, one of the factors in the rule of multiplication; being that number which is given to be multiplied by another, which is called the multiplicator, or multiplier.

MULTIPLICATION, in general, the act of increaſing the number of any thing.

MULTIPLICATION, in arithmetic, is a rule, by which any given number may be ſpeedily increaſed, according to any propoſed number of times.

Multiplication, which is the fourth rule in arithmetic, ſerves inſtead of many additions; the product of a multiplication being only the repetition of the multiplicand, ſo many times as there are units in the multiplier.

Caſe I. To multiply ſingle numbers by one another.

All the variety that can happen in this caſe, is expreſſed in the following table of multiplication, which muſt be perfectly got by heart, for the ready performance of any operation in multiplication: thus we learn, by the table, that 3 times 3 is 9; that 3 times 6 is 18, &c. We have in this table, omitted multiplying with 2, it being ſo very eaſy that any one may do it.

MULTIPLICATION TABLE.

$3\times3=9$	$4\times4=16$	$5\times5=25$	$6\times6=36$	$7\times7=49$	$8\times8=64$
$3\times4=12$	$4\times5=20$	$5\times6=30$	$6\times7=42$	$7\times8=56$	$8\times9=72$
$3\times5=15$	$4\times6=24$	$5\times7=35$	$6\times8=48$	$7\times9=63$	$9\times9=81$
$3\times6=18$	$4\times7=28$	$5\times8=40$	$6\times9=54$		
$3\times7=21$	$4\times8=32$	$5\times9=45$			
$3\times8=24$	$4\times9=36$				
$3\times9=27$					

Caſe II. To multiply a compound number by a ſingle one.

Rule. Having placed the multiplier under the unit's place of the multiplicand; firſt, multiply the unit of the multiplicand by the multiplier; if their product be leſs than ten, ſet it down underneath its own place of units, and proceed to the next figure of the multiplicand: but if their product be above ten, or tens, then ſet down the overplus only, or odd figure, as in addition, and carry the ſaid ten or tens in mind, till you have multiplied the next figure of the multiplicand with the multiplier: then, to their product add the ten or tens beared in mind, ſetting down the overplus of their ſum above the tens, as before; and ſo proceed in that manner till all the figures of the multiplicand are multiplied with the multiplier.

Example. Suppoſe it were required to multiply 3213 by 3.

3213 Multiplicand.
3 Multiplier.
9639

For, beginning at the unit's place 3, ſay, 3 times 3 is 9, which, becauſe it is leſs than ten, ſet down underneath its own place, and proceed to the next place of tens, ſaying 3 times 1 is 3, which ſet down underneath its own place; then at the next place, viz. of hundreds, ſay, 3 times 2 is 6, which ſet down as before; laſtly, at the place of thouſands, ſay, 3 times 3 is 9, which being ſet down underneath its own place, the operation is finiſhed, and the true product is 9639.

Caſe III. To multiply one compound number by another.

Rule. Place every number reſpectively under its own kind; multiply each figure of the multiplicand by each figure of the multiplier as before; and obſerve to ſet the firſt figure of each reſpective product under that figure of the multiplier, by which it was made; laſtly, add the ſeveral products together for the whole product.

Example 1. Let it be required to multiply 78094 by 7563.

78094	Multiplicand.
7563	Multiplier.
234282	The firſt particular product with 3.
468564	The ſecond particular product with 60.
390470	The third particular product with 500.
546658	The 4th particular product with 7000.
590624922	The total, or true product required.

When there is a cypher or cyphers to the right hand, either of the multiplicand or multiplier, or to both, in that caſe, multiply the figures as before, neglecting the cyphers until the particular products are added together; then to their ſum annex ſo many cyphers as there are in either or both the factors, as in the following examples:

Example 2.	Example 3.	Example 4.
9538	87600	785000
4600	79	56900
57228	7884	7065
38152	6132	4710
43874800	6920400	3925
		44666500000

If it be required to multiply any number by 10, 100, 1000, 10000, &c. it is only annexing the cyphers of the multiplier to the figures of the multiplicand, and the work is done: thus 578 × 10 = 5780, 578 × 100 = 57800, 578 × 1000 = 578000, 578 × 10000 = 5780000, &c. If a quantity be multiplied by the component part of the multiplier, the product will be the ſame as if it had been multiplied by the multiplier itſelf: thus, 245 by 7, and the product by 6 is the ſame as if 245 was multiplied by 7 × 6, that is, by 42.

For the proof of multiplication, it is to be obſerved, that the product is then right when being divided by the multiplier it quotes the multiplicand; or divided by the multiplicand it quotes the multiplier. See DIVISION.

Croſs MULTIPLICATION, otherwiſe called duodecimal arithmetic, is an expeditious method of multiplying things of ſeveral ſpecies or denominations, by others likewiſe of different ſpecies, &c. viz. ſhillings and pence, by ſhillings and pence; feet and inches, by feet and inches.

This is much uſed in meaſuring, &c. and the method is thus:

Suppoſe 5 feet 3 inches to be multiplied by 2 feet 4 inches; ſay, 2 times 5 feet is 10 feet, and 2 times 3 is 6 inches; again, ſay, 4 times 5 is 20 inches, or 1 foot 8 inches; and 4 times 3 is 12 parts, or 1 inch: the whole ſum makes 12 feet 3 inches. In the ſame manner you may manage ſhillings and pence, &c.

F.	I.
5	3
2	4
10	6
1	8
	1
12	3

For the multiplication of vulgar and decimal fractions, ſee FRACTION and DECIMAL.

MULTIPLICATION, in algebra. The general rule for the ſigns is, that when the ſigns of the factors are alike (*i. e* both + or both −) the ſign of the product is +; but when the ſigns of the factors are unlike, the ſign of the product is −.

Caſe 1. When any poſitive quantity, $+a$, is multiplied by any poſitive number, $+n$, the meaning is, that $+a$ is to be taken as many times as there are units in n; and the product is evidently na.

Caſe 2. When $-a$ is multiplied by n, then $-a$ is to be taken as often as there are units in n; and the product muſt be $-na$.

Caſe 3. Multiplication by a poſitive number implies a repeated addition: but multiplication by a negative implies a repeated ſubtraction. And, when $+a$ is to be multiplied by $-n$, the meaning is that $+a$ is to be ſubtracted as often as there are units in n: therefore the product is negative, being $-na$.

Caſe 4. When $-a$ is to be multiplied by $-n$, then $-a$ is to be ſubtracted as often as there are units in n; but to ſubtract $-a$ is equivalent to adding $+a$, conſequently the product is $+na$. The ſecond and fourth caſes may be illuſtrated in the following manner:

It is evident that $+a-a=0$; therefore if we multiply $+a-a$ by n, the product muſt vaniſh or be 0, becauſe the factor $a-a$ is 0. The firſt term of the product is $+na$ (by caſe 1.) Therefore, the ſecond term of the product muſt be $-na$, which deſtroys $+na$; ſo that the whole product muſt be $+na-na=0$. Therefore, $-a$ multiplied by $+n$ gives $-na$.

In the like manner, if we multiply $+a-a$ by $-n$, the firſt term of the product being $-na$, the latter term of the product muſt be $+na$, becauſe the two together muſt deſtroy each other, or their amount 0, ſince one of the factors (viz. $a-a$) is 0. Therefore, $-a$ multiplied by $-n$ muſt give $+na$.

If the quantities to be multiplied are ſimple, find the ſign of the product by the laſt rule; after it place the product of the co-efficients, and ſet down all the letters after one another as before.

EXAMPLES.

Mult.	$+a$	$-2a$	$+6x$
By	$+b$	$+4b$	$-5a$
Product	$+ab$	$-8ab$	$-30ax$
Mult.	$-8x$	$+3ab$	
By	$-4a$	$-5ac$	
Product	$+32ax$	$-15aabc$.	

To multiply compound quantities, you muſt multiply every part of the multiplicand by all the parts of the multiplier taken one after another, and then collect all the products into one ſum: the ſum ſhall be the product required.

$$\begin{array}{r|l|l}
\text{Mult.} & a+b & 2a-3b \\
\text{By} & \underline{a+b} & \underline{4a+5b} \\
\text{Prod.}\left\{\right. & aa+ab & 8aa-12ab \\
 & \quad +ab+bb & \quad +10ab-15bb \\ \hline
\text{Sum} & aa+2ab+bb & 8aa-2ab-15bb
\end{array}$$

$$\begin{array}{r|l|l}
\text{Mult.} & 2a-4b & xx-ax \\
\text{By} & \underline{2a+4b} & \underline{x+a} \\
\text{Prod.}\left\{\right. & 4aa-8ab & xxx-axx \\
 & \quad +8ab-16bb & \quad +axx-aax \\ \hline
\text{Sum} & 4aa\,..\,0.\,-16bb & xxx\,..\,0\,..\,-aax
\end{array}$$

$$\begin{array}{rl}
\text{Mult.} & aa+ab+bb \\
\text{By} & \underline{\quad a-b} \\
\text{Prod.}\left\{\right. & aaa+aab+abb \\
 & \quad -abb-abb-bbb \\ \hline
\text{Sum} & aaa\,..\,0\,...\,0\,..\,0\,..\,-bbb
\end{array}$$

Products that ariſe from the multiplication of 2, 3, or more quantities, as abc, are ſaid to be of 2, 3, or more dimenſions; and thoſe quantities are called factors or roots.

If all the factors are equal, then theſe products are called powers; as aa or aaa are powers of a. Powers are expreſſed ſometimes by placing, above the root to the right hand, a figure expreſſing the number of factors that produce them. thus:

$$\left.\begin{array}{l} a \\ aa \\ aaa \\ aaaa \\ aaaaa \end{array}\right\} \left\{\begin{array}{l} \text{1ſt} \\ \text{2d} \\ \text{3d} \\ \text{4th} \\ \text{5th} \end{array}\right\} \begin{array}{l} \text{power of the root } a, \\ \text{and is generally ex-} \\ \text{preſſed thus:} \end{array} \left\{\begin{array}{l} a \\ a^2 \\ a^3 \\ a^4 \\ a^5 \end{array}\right.$$

Theſe figures which expreſs the number of factors that produce powers are called their indices or exponents; thus 2 is the index of a^2. And powers of the ſame root are multiplied by adding their exponents thus: $a^2 \times a^3 = a^5$. $a^4 \times a^3 = a^7$. $a^3 \times a = a^4$.

Sometimes it is uſeful not actually to multiply compound quantities, but to ſet them down upon the ſign of multiplication (×) between them, drawing a line over each of the compound factors. Thus $\overline{a+b} \times \overline{a-b}$ expreſſes the product of $a+b$ multiplied by $a-b$.

Multiplication of ſurds. See **Surds**.

MULTIPLICATOR, or **Multiplier**, in arithmetic, a number multiplying another called the multiplicand.

The larger number is generally made the multiplicand, and is placed above the ſmaller, or multiplicator: but the reſult is the ſame, which ſoever of the numbers be made multiplicand, or multiplier.

MULTIPLYING-Glass, in optics, one wherein objects appear increaſed in number.

It is otherwiſe called a polyhedron, being ground into ſeveral planes, that make angles with each other; through which the rays of light iſſuing from the ſame point undergo different refractions, ſo as to enter the eye from every ſurface in a different direction.

MULTISILIQUOUS Plants, thoſe which have after each flower many diſtinct, long, ſlender, ſiliquæ, or pods, in which their ſeed is contained: ſuch are bear's-foot, columbine, houſe-leek, navelwort, orpine, &c.

MULTITUDE, an aſſemblage, or collection of a great number of diſtinct perſons or things.

MULTIVALVES, in natural hiſtory, the name of a general claſs of ſhell-fiſh; diſtinguiſhed from the univalves, which conſiſt of only one ſhell, and the bivalves, which conſiſt of two; by their conſiſting of three or more ſhells.

MUM, a kind of malt-liquor, much drank in Germany; and chiefly brought from Brunſwick, which is the place of moſt note for making it. The proceſs of brewing mum, as recorded in the town-houſe of that city, is as follows: Take ſixty-three gallons of water that has been boiled till one-third part is conſumed, and brew it with ſeven buſhels of wheaten-malt, one buſhel of oat-meal, and one buſhel of ground beans; when it is tunned, the hogſhead muſt not be filled too full at firſt; as ſoon as it begins to work, put into it three pounds of the inner rind of fir; one pound of the tops of fir and beach; three handfuls of carduus benedictus; a handful or two of the flowers of roſa ſolis; add burnet, betony, marjoram, avens, penny-royal, and wild thyme, of each a handful and a half; of elder-flowers, two handfuls or more; ſeeds of cardamum bruiſed, thirty ounces; barberries bruiſed, one ounce: when the liquor has worked a while, put the herbs and ſeeds into the veſſel; and, after they are added, let it work over as little as poſſible; then fill it up: laſtly, when it is ſtopped, put into the hogſhead ten new-laid eggs unbroked: ſtop it cloſe, and drink it at two years end. Our Engliſh brewers, inſtead of the inner rind of fir, uſe cardamum, ginger, and ſaſſafras; and alſo add elecampane, madder, and red-ſanders. Mum, on being imported, pays for every barrel 1 l. 5 s.

MUMMY, a body embalmed or dried, in the manner uſed by the ancient Egyptians: or the compoſition with which it is embalmed.

Mummy, among gardeners, a kind of wax uſed in grafting and planting the roots of trees, made in the following manner: Take one pound of black pitch, and a quarter of a pound of turpentine; put them together into an earthen pot, and ſet them on fire in the open air, holding ſomething in your hand to cover and quench the mixture in time, which is to be alternately lighted and quenched till all the nitrous and volatile parts be evaporated. To this a little common wax is to be added; and the compoſition is then to be ſet by for uſe.

MUNDIC, in natural hiſtory, a metallic mineral, more commonly called marcaſite.

MUNICIPAL, in the Roman cival law, an epithet which ſignifies inveſted with the rights and privileges of Roman citizens.

MUNIMENTS, or MINIMENTS, the writings relating to a perſon's inheritance, by which he is enabled to defend his title to his eſtate: or, in a more general ſenſe, all manner of evidences, ſuch as charters, feoſments, releaſes, &c.

MUNIMENT-HOUSE, a little ſtrong room in a cathedral, college, or univerſity, deſtined for keeping the ſeal, charters, &c. of ſuch cathedral, college, &c.

MUNIONS, in architecture, are the ſhort, upright poſts or bars which divide the ſeveral lights in a window-frame.

MUNITION, the proviſions with which a place is furniſhed in order for defence; or that which follows a camp for its ſubſiſtence.

MUNITION-SHIPS, are thoſe that have ſtores on board in order to ſupply a fleet of men of war at ſea. In an engagement, all the munition ſhips, and victuallers attending the fleet, take their ſtations in the rear of all the reſt; they are not to engage in the fight, but to attend ſuch directions as are ſent them by the admiral.

MUNTINGIA, in botany, a genus of plants whoſe flower conſiſts of five roundiſh patent petals inſerted in the cup; the ſtamina are a great number of very ſhort capillary filaments, topped with roundiſh antheræ. The fruit is a globoſe, umbilicated berry, containing a great many very ſmall roundiſh ſeeds.

MURAGE, a toll taken of every cart or horſe coming laden into a city, for repairing the walls.

MURAL, in general, any thing belonging to a wall, which the Latins call murus.

MURAL ARCH, is a wall, or walled arch, placed exactly in the plane of the meridian, for fixing a large quadrant, ſextant, or other inſtrument, in order to obſerve the meridian altitudes of the heavenly bodies.

MURDER, or MURTHER, in law, is the wilful and felonious killing a perſon from premeditated malice; provided the party wounded or otherwiſe hurt, die within a year and a day after the fact was committed.

MURDERERS, or MURDERING PIECES, in a ſhip, are ſmall pieces of ordnance, either of braſs or iron, which have chambers put in at their breeches. They are uſed at the bulk-heads of the forecaſtle, half-deck, or ſteerage, in order to clear the deck, on the ſhip's being boarded by an enemy.

MUREX, in natural hiſtory, a genus of univalve or ſimple ſhells, without any hinge, formed of a ſingle piece, and beſet with tubercles or ſpines: the mouth is large and oblong, and has an expanded lip, and the clavicle is rough.

MURRAIN, or GARGLE, a contagious diſeaſe among cattle, principally cauſed by a hot dry ſeaſon, or rather by a general putrifaction of the air, which begets an inflammation of the blood, and a ſwelling in the throat, that ſoon prove mortal, and is communicated from one to another, though it generally goes no farther than to thoſe of the ſame kind.

The ſymptoms of this diſeaſe are a hanging down and ſwelling of the head, abundance of gum in the eyes, rattling in the throat, a ſhort breath, palpitation at the heart, ſtaggering, a hot breath, and a ſhining tongue.

In order to prevent this diſeaſe, the cattle ſhould ſtand cool in ſummer, have plenty of good water; all carrion ſhould be ſpeedily buried; and as the feeding of cattle in wet places, on rotten graſs and hay, ofren occaſions this diſeaſe, dry and ſweet fodder ſhould be given them. The following receipt is much recommended for the cure of this diſeaſe in black cattle: Take diapente, a quarter of an ounce; dialthæa or marſhmallows, London treacle, mithridate and rhubarb, of each the quantity of a nut; of ſaffron a ſmall quantity; wormwood, and red ſage, of each an handful; and two cloves of garlic: boil all together in two pints of beer, till it be reduced to a pint and a half, and give it the beaſt luke warm, while faſting: half the proportion will ſerve for a cow. They muſt be kept warm, and take a maſh of ground malt, drinking warm water for a week, and ſometimes have boiled oats. If ſheep are troubled with this diſtemper, give them a few ſpoonfuls of brine, and then a little tar.

MURREY, in heraldry, a kind of purple colour.

MUSA, the plantain tree, in botany. See the article PLANTAIN.

MUSCADINE, a rich kind of wine, of the growth of Provence and Languedoc, in France.

MUSCARI, muſk hyacinth, in botany, a genus of plants, whoſe flower conſiſts of an oval pitcher-ſhaped petal, reflexed at the brim with three nectariums and ſix ſubulated filaments, topped with antheræ coaleſcing together. The fruit is a roundiſh, trigonal capſule, having three cells, which contain ſeveral roundiſh ſeeds.

MUSCLE, *Muſculus*, in anatomy, a part of the human body, deſtined to move ſome other part, and that in general by a voluntary motion, or ſuch as is dictated by the will; being compoſed principally of fleſh and tendinous fibres, which have alſo veſſels of all kinds, as arteries, veins, nerves, and lymphatics; all which are ſurrounded by, or encloſed in, one common membrane.

The muſcular fibres are, according to the action they are intended for, of various directions; ſome ſtreight, others oblique, tranſverſe, annular, and ſpiral. Some conſiſt of one uniform ſeries of fibres, and on that account are called ſimple; others are compoſed of various, and often contrary courſes of fibres, and theſe being cloſely arranged together, the large one ſeems to be made up of a number of leſſer muſcles, and is therefore called compound; and the more of theſe cluſters of fibres, or ſmaller veſſels, enter into the compoſition of a larger one, the thicker and ſtronger it is.

A muſcle is divided, by anatomiſts, into the body, and the two extremities: the body is alſo called the venter or belly of the muſcle; and the two extremities, if white, are called tendons.

That extremity where the muſcle ariſes, is called its head, caput; or its beginning, origin, or fixed point: and its other extremity, or end, is called its tail, moveable point, and often its tendon; and, finally, if this be broad and membranous, it is called an aponeuroſis.

In many of the muſcles, both the extremities are moveable: in theſe, that part which of the two is leaſt moveable, is always called the head, and the more moveable part the tail. This, however, cannot be done univerſally; ſince there are caſes in which that extremity of a muſcle, which was before the moveable point, becomes the fixed point; and *vice verſa*, as in the ſerrati antici, and ſome of the muſcles of the abdomen, not to mention any others.

Action of the MUSCLES. This conſiſts in the contraction of its belly, after whatever manner that is done: by this means its extremities approach towards each other; and, by this means alſo, the part in which the end of the muſcle is inſerted, moves as if it were drawn by a cord. Schelhammer is of opinion, that this contraction of the belly of the muſcle is effected by a corrugation of the fibres, in the ſame manner as we ſee an earth-worm ſhorten and contract itſelf by corrugating its ſkin, &c. Morgagni, on the other hand, alledges, that in order to underſtand the power of motion in a muſcle, we ought to attend to Wallis's experiment; by which it is evidently proved, that the ſmalleſt force imaginable of the air, driven through a cylindric tube into a bladder, will, by diſtending its width, and ſhortening its length, cauſe it to riſe up, and ſuſtain a weight of ſixty or ſeventy pounds.

Others have demonſtrated, from hydroſtatical principles, that a very ſmall quantity of a fluid, directed through a ſmall cylindric tube, placed in a veſſel of a larger baſe, and already filled, will be able, in the ſame manner, to move and raiſe up a large weight; from whence they conclude, that the belly of a muſcle ſwells in the time of its contraction or action; and that this intumeſcence may, nay and muſt, have very great effects.

Among the muſcles, there are different ones that conſpire in the ſame action, and ſo perform the ſame motion as aſſociates: ſuch are the flexors or extenſors of the arm, and the like: hence theſe, and ſuch others as conſpire in the ſame manner to the ſame action, are called by authors ſocii and congeneres.

When, on the other hand, we regard the contrary actions of certain muſcles, as the extenſors of any part which act quite contrary to the flexors, theſe are called antagoniſt muſcles; in this caſe both the kinds acting together, render the limbs rigid or immoveable: this action of the muſcles is called motus tonicus.

MUSCLE, *Mytulus*, in natural hiſtory, a ſhell compoſed of two valves, of an oblong figure, and ſhutting cloſe all the way; the valves are both convex, and of a ſimilar ſhape: and the animal inhabiting it is called a tethys.

MUSCOVY-GLASS, in natural hiſtory, the white ſhining ſpecularis with large and broad leaves, otherwiſe called iſinglaſs. See the article SPECULARIS.

MUSCULAR, or MUSCULOUS, in anatomy, ſomething relating to, or partaking of the nature of a muſcle. ſee the article MUSCLE.

MUSEUM, a name which originally ſignified a part of the palace of Alexandria, which took up at leaſt one fourth of that city. This quarter was called the muſeum, from its being ſet apart for the muſes and the ſtudy of the ſciences. Here were lodged and entertained the men of learning, who were divided into many companies or colleges, according to the ſciences of which they were the profeſſors; and to each of theſe houſes or colleges was allotted a handſome revenue. The foundation of this eſtabliſhment is attributed to Ptolemy Philadelphus, who here placed his library. Hence the word muſeum is now applied to any place ſet apart as a repoſitory for things that have an immediate relation to the arts.

MUSES, certain fabulous divinities amongſt the pagans, ſuppoſed to preſide over the arts and ſciences: for this reaſon it is uſual for the poets, at the beginning of a poem, to invoke theſe goddeſſes to their aid.

MUSHROOM, *Fungus*, in botany, a genus of imperfect plants, compoſed of a pedicle, crowned with a broad head, convex and ſmooth at the top; and hollow, foliated, lamellated, or fiſtulous on the under ſide.

Muſhrooms are by many ſuppoſed to be produced from the putrefaction of the dung in which they are found; but notwithſtanding this notion is pretty generally received among the unthinking part of mankind, yet, by the curious naturaliſts, they are eſteemed real plants; for they have a regular root, a ſtalk conſiſting of ſeveral arrangements of fibres, the interſtices of which are filled up with a parenchymatous ſubſtance, leading from the root to the head or umbel, the under-ſide of which is full of lamellæ or chives, every one of which is a regular pod or ſeed-veſſel. If theſe lamellæ are examined in their ſeveral ſtates, the ſeeds in them may be eaſily diſcovered, and are always found to be of a ſize and degree of maturity proportioned to the ſtate of the plant: they have each of them alſo a ſiliquaceous aperture lengthwiſe, the ſeeds lying in rows ready to fall through it. The plant is eaſily and regularly propagated through theſe, and may not only be raiſed from ſeed, but, like many other plants, may be propagated by roots; the ſeveral filaments at the root producing tubercles, in the manner of the potatoe; from each of which there will ariſe new roots, and a new plant. Hence, like other vegetables, they are annually propagated by the gardeners near London for ſale. We ſhall therefore deſcribe the method of cultivating them; but as there are ſeveral unwholeſome ſorts, we ſhall firſt give a ſhort deſcription of the true eatable kinds. Theſe at firſt appear of a roundiſh form, like a button, the upper part of which, as alſo the ſtalk, is very white: but being opened, the under part is of a livid fleſh-colour, but the fleſhy part, when broken, is very white: when theſe are ſuffered to remain undiſturbed, they will grow to a large ſize, and explicate themſeves almoſt to a flatneſs, and the red part underneath will change to a dark colour.

Mr. Miller directs the following method of cultivating them. If you have no beds of your own that produce them, you ſhould look abroad in rich paſtures, during the months of Auguſt and September, till you find them; and then opening the ground about their roots, you will often find the earth full of ſmall white knobs, which are off-ſets from the muſhrooms: theſe ſhould be carefully gathered, and preſerved dry with the earth about them. The muſhroom-beds ſhould be made of dung in which there is good ſtore of litter. Theſe beds ſhould be made on dry ground, and the dung being laid upon the ſurface about a foot thick, two feet and a half broad, and of a length in proportion to the quantity of muſhrooms deſired, it ſhould be covered about four inches deep with ſtrong earth; upon this lay more dung, about ten inches thick; then another layer of earth; ſtill drawing in the ſides of the bed, ſo as to form it like the ridge of an houſe, which may be done by three layers of dung and as many of earth. When the bed is finiſhed it ſhould be covered with litter, to keep out the wet, and prevent its drying; in this ſituation it may remain eight or ten days, by which time it will be of a proper degree of warmth; the litter ſhould then be taken off, the ſides of the bed ſmoothed, and a covering of light rich earth ſhould be laid over the bed; upon this the ſmall roots or off-ſets of the muſhrooms ſhould be put, placing them two or three inches aſunder; then gently cover them about half an inch thick with the ſame light earth; and again put on the covering of litter. The great ſkill in managing theſe beds, is that of keeping them in a proper temperature of moiſture. By this means muſhrooms may be produced all the year; and when the beds are deſtroyed, the ſurface which contains the duſt and roots of the muſhrooms, ſhould be laid by in a dry place for a freſh ſupply, till the proper time of uſing it.

MUSIC, is one of the ſeven ſciences, commonly called liberal, and comprehended alſo among the mathematical, as having for its object diſcrete quantity or number, but not conſidering it in the abſtract like arithmetic, but in relation to time and ſound, in order to make a delightful harmony: or it is the art of diſpoſing and conducting ſounds conſidered as acute and grave; and proportioning them among themſelves, and ſeparating them by juſt intervals pleaſing to the ſenſe.

Mr. Malcolm defines it a ſcience that teaches how ſound, under certain meaſures of time and tune, may be produced; and ſo ordered and diſpoſed, as either in conſonance (i. e. joint ſounding) or ſucceſſion, or both, they may raiſe agreeable ſenſations.

MUSK, a dry, light, and friable ſubſtance, of a dark blackiſh colour, tinged with purple; it is a kind of perfume of a very ſtrong ſcent, and only agreeable when in a very ſmall quantity, or moderated by the mixture of ſome other perfume. It is found in a kind of bag or tumour which grows under the belly of a wild beaſt called moſchus. See Moschus. Muſk is brought to us ſewed up in a kind of bladders or caſes of ſkin of the bigneſs of a pigeon's egg, or larger, each containing from two or three drams to an ounce of muſk. Theſe are covered with a browniſh hair, and are the real capſules in which the muſk is lodged while on the animal. That which is unadulterated appears in maſſes, of looſe and friable granules, which are ſoft to the touch, and eaſily crumble between the fingers, feeling ſomewhat ſmooth and unctuous.

Muſk taken inwardly produces eaſe from pain, quiet ſleep, and a copious diaphoreſis: hence it has been found of great uſe in ſpaſmodic diſorders, petechial, malignant, putrid fevers, the jail diſtemper, hiccoughs, &c. and Dr. Wall obſerves, that it has been found uſeful in ſpaſmodic diſorders, given by way of clyſter. The operation of muſk in ſome reſpects reſembles that of opium; but it does not leave behind it any ſtupor or languidneſs, which the other often does. Muſk ſeems likely to anſwer in thoſe low caſes where ſleep is much wanted, and opiates are improper. It is ſaid to be beſt given in a bolus, in which form thoſe who are moſt averſe to perfumes, may take it without inconvenience. Fifteen grains or more are now given in a doſe with great ſucceſs.

MUSKET, a fire-arm borne on the ſhoulder, and uſed in war. The length of the muſket is fixed at three feet eight inches from the muzzle to the pan, and it carries a ball of ſixteen to the pound.

MUSKETOON, a kind of ſhort thick muſket, whoſe bore is the thirty-eighth part of its length: it carries five ounces of iron, or ſeven and a half of lead, with an equal quantity of powder. This is the ſhorteſt ſort of blunderbluſſes. See the article Blunderbuss.

MUSLIN, a fine thin ſort of cotton-cloth, which bears a downy knap on its ſurface. There are ſeveral ſorts of muſlins brought from the Eaſt-Indies, and more particularly from Bengal; ſuch as doreas, betelles, mulmuls, tanjeebs, &c.

MUSTARD, *Sinapis*, in botany. See the article Sinapis.

MUSTER, in the marine, a ſummoning together the crew of any particular ſhip, and calling them ſeverally over by their names.

MUTE, in grammar, a letter which yields no ſound without the addition of a vowel.

MUTILATION, the retrenching or cutting away any member of the body.

This word is alſo extended to ſtatues and buildings, where any part is wanting, or the projecture of any member, as a corniche or an impoſt, is broken off.

MUTULE, in architecture, a kind of ſquare modillion ſet under the corniche of the Doric order. See Doric.

The only difference between the mutule and modillion conſiſts in this, that the former is uſed in ſpeaking of the Doric order, and the latter in the Corinthian.

MUZZLE *of a Gun or Mortar*, the extremity at which the powder and ball is put in; and hence, the muzzle-ring is the metalline circle, or moulding, that ſurrounds the mouth of the piece.

MYAGRUM, in botany, a genus of plants, the corolla whereof conſiſts of four plane, roundiſh, obtuſe petals, diſpoſed croſs-wiſe, and narrower than the ungues. The fruit is a bivalve turbinatocordated ſmall pod, lightly compreſſed and rigid, with the apex ending in a conical rigid ſtyle; the ſeeds are roundiſh.

MYGINDA, in botany, a genus of plants, whoſe flower contains four roundiſh, plane, ſpreading petals, with four ſubulated filaments topped with roundiſh antheræ. The fruit is a globoſe drupe, containing an acute oval nut.

MYLOGLOSSUM, in anatomy, is, according to Heiſter, no more than a part of the mylohyoides, though other anatomiſts make it a diſtinct pair of muſcles, thus called becauſe it ariſes about the backſide of the molares, and is inſerted into the ligament of the tongue, helping to pull it upwards; being the ſame with what Cowper calls ſtylogloſſum.

MYLOHYOIDÆUS, in anatomy, one of the five pair of muſcles belonging to the os hyoides. The mylohyoidæus ariſes with a large baſe from the bottom of the lower jaw, near the chin, and terminates at the baſe of the os hyoides. See the article Hyoides.

Beſides the common uſe aſcribed to this muſcle, which is to move the hyoides, the tongue, and the larynx, both upwards, inwards, and ſideways, its ſeries of tranſverſe fibres have a farther uſe, when it is at reſt; and that is, to compreſs the glands under the tongue, and by this means promote the diſcharge of the ſaliva into the mouth from the lower ſalival ducts: whence it is we uſe this muſcle, when we want ſaliva in the mouth.

MYOLOGY, μυολογια, that part of anatomy which treats of the muſcles of the human body.

MYOPIA, or Myopias, ſhort-ſightedneſs, a ſpecies of viſion, wherein objects are ſeen diſtinctly only at ſmall diſtances; which is incident to perſons who have the cornea or cryſtalline, or either of them, too convex.

MYOSOTIS, in botany, a genus of plants whoſe flower is monopetalous and ſaucer-ſhaped; the limb is cut into five parts, and the edges are emarginated: in the bottom of the cup are placed four ſmooth, acuminated, oval ſeeds.

MYRIAD, a term ſometimes uſed to denote ten thouſand.

MYRICA, in botany, a genus of the dioecia claſs of plants; the male flowers are produced in an oblong oval amentum, imbricated on every ſide; the female flowers have no corolla; the piſtillum is an oval germen, with two ſlender ſtyles; the fruit is an unilocular berry, containing a ſingle ſeed.

MYRIOPHYLLUM, in botany, a genus of plants, producing male and female flowers on the ſame plant; the male flower has no corolla; the cup is compoſed of four oblong erect leaves, and the ſtamina are eight hairy filaments, terminated with oblong antheræ; the female flower is like the male, and contains four oblong germina, which afterwards become four oblong ſeeds.

MYRISTICA, the nutmeg-tree, in botany. See Nutmeg.

MYRMECIA, or Formica, a painful kind of wart, with a broad baſe, and deeply rooted; growing on the palms of the hands, and ſoles of the feet.

MYROBALANS, a kind of medicinal fruit, brought from the Indies, of which there are five kinds: 1. the citrine, of a yellowiſh red, hard, oblong, and the ſize of an olive: 2. the black or Indian myrobalan, of the bigneſs of an acorn, wrinkled, and without a ſtone: 3. chebulic myrobalans, which are of the ſize of a date, pointed at the end, and of a yellowiſh brown: 4. emblic, which are round, rough, the ſize of a gall, and a dark brown: and, 5. belleric, which are hard, round, of the ſize of an ordinary prune, leſs angular than the reſt, and yellow.

Each of theſe kinds are ſlightly purgative and aſtringent; but Quincy obſerves, that the beſt of them are not worth regarding, ſince they rather clog than aſſiſt any compoſition.

MYRRH, a vegetable production of the gum or reſin kind, iſſuing by inciſion, and ſometimes ſpontaneouſly, from the trunk and larger branches of a tree growing in Egypt, Arabia, and Abiſſinia. The inciſions are made twice a year, and the myrrh ooſing out, is received on ruſh mats diſperſed underneath.

Myrrh is ſent over to us in looſe granules of various ſizes, from that of a pepper-corn to the bigneſs of a walnut. The generality of them, however, is from the ſize of a pea, to a little more than that of a horſe-bean: theſe are ſometimes roundiſh, but often irregularly long and contorted.

The colour of myrrh is a reddiſh brown, with more or leſs of an admixture of yellow, and in the pureſt pieces it is ſomewhat tranſparent. Its taſte is bitter and acrid, with a peculiar aromatic flavour, but very nauſeous: but its ſmell, though ſtrong, is not diſagreeable. It is to be choſen in clear pieces, light, friable, and of the bittereſt taſte.

Myrrh is of great uſe in medicine; it powerfully reſolves and attenuates thick and viſcid blood, concreted bile, and glutinous humours; it is good in obſtructions of the menſes, and in infarctions of the viſcera. It alſo promotes delivery, and expulſion of the ſecundines; it is good in aſthmas, and in caſes of tubercles of the lungs; it is of great ſervice in the jaundice, and in cachectic complaints; it deſtroys worms, ſtrengthens the ſtomach, and diſſipates flatulencies.

Externally applied, it is diſcutient and vulnerary; it cleanſes old ulcers, and diſpoſes them to heal; but it gives many people the head-ach: and as it promotes diſcharge of blood, ſhould never be given to perſons ſubject to ſuch diſcharges, as ſpitting of blood, or the like, or to women in the time of their pregnancy. It is adminiſtered either in pills, boluſes, or tinctures; it not conveniently agreeing with any other forms.

MYRSINE, in botany, a genus of plants whoſe flower conſiſts of a ſingle petal, divided into five ſemi-oval, obtuſe, and connivent petals: the fruit is a roundiſh depreſſed berry, containing five cells, with a ſingle ſeed in each.

MYRTIFORM, in anatomy, an appellation given to ſeveral parts, from their reſembling myrtle-berries: thus we meet with the myrtiform caruncles, and the myrtiform muſcle of the noſe, which ariſes near the inciſorius of the upper lip, and is inſerted into the alæ of the noſe.

MYRTLE, *Myrtus*, in botany, a genus of plants, the flower of which conſiſts of a monophyllous cup, in which is inſerted five large oval petals, with a great number of hairy filaments topped with ſmall antheræ: the fruit is an oval berry, with three cells, containing in each a kidney-ſhaped ſeed.

There are ſeveral ſorts of myrtle, ſuch as the broad-leaved myrtle, narrow-leaved myrtle, nutmeg myrtle, orange myrtle, variegated myrtle, with ſeveral other varieties. They may be all propagated from cuttings, or ſlips, in the ſummer; making choice of the moſt vigorous ſhoots of the ſame year's growth: they ſhould be planted in pots and covered with glaſſes, which prevents the air from getting at them, and facilitates their taking root. When winter comes on, they ſhould be removed into a green-houſe; and the ſpring following, they may be tranſplanted ſingly into ſmall pots. In hot weather they ſhould have plenty of water.

Myrtle-berries are rough and aſtringent, not much preſcribed in compoſition for inward uſe, but they enter ſeveral ſtrengthening plaiſters; the ſyrup of them is eſteemed good againſt abortion, and in fluxes of all kinds.

MYRTUS, the myrtle. See MYRTLE.

MYSTERY, ſomething ſecret or concealed, impoſſible or difficult to comprehend.

MYSTICAL, ſomething myſterious or allegorical.

Some of the commentators upon the ſacred writings, beſides a literal, find alſo a myſtical meaning. The ſenſe of ſcripture, ſay they, is either that immediately ſignified by the words and expreſſions in the common uſe of language; or it is mediate, ſublime, typical, and myſtical. The literal ſenſe they again divide into proper literal, which is contained in the words taken ſimply and properly; and metaphorical literal, where the words are to be taken in a figurative and metaphorical ſenſe. The myſtical ſenſe of ſcripture they divide into three kinds: the firſt, correſponding to faith, and called allegorical; the ſecond, to hope, called anagogical; and the third, to charity, called the tropological ſenſe: and ſometimes, they take the ſame word in ſcripture in all the four ſenſes; thus the word Jeruſalem, literally ſignifies the capital of Judæa; allegorically, the church militant; tropologically, a believer; and anagogically, heaven. So that paſſage in Geneſis, *let there be light, and there was light*, literally ſignifies corporeal light; by an allegory, the Meſſiah; in the tropological ſenſe, grace; and anagogically, beautitude, or the light of glory. See the articles ANAGOGICAL, &c.

MYSTICS, a religious ſect, diſtinguiſhed by their profeſſing a pure, ſublime, and perfect devotion, with an intire diſintereſted love of God, free from all ſelfiſh conſiderations, and by their aſpiring to a ſtate of paſſive contemplation.

MYTHOLOGY, μυθολογια, the hiſtory of the fabulous gods and heroes of antiquity, with the explanations of the myſteries and allegories couched therein.

Lord Bacon thinks, that a great deal of concealed inſtruction and allegory was originally intended in moſt part of the ancient mythology: he obſerves, that ſome fables diſcover a great and evident ſimilitude, relation, and connection, with the thing they ſignify; as well in the ſtructure of the fable, as in the meaning of the names, whereby the perſons or actors are characterized.

The ſame writer thinks, it may paſs for a farther indication of a concealed and ſecret meaning, that ſome of theſe fables are ſo abſurd and idle in their narration, as to ſhew an allegory even afar off: but the argument of moſt weight upon this ſubject he takes to be this, that many of theſe fables appear by no means to have been invented by the perſons who relate them: he looks on them not as the product of the age, nor invention of the poets, but as ſacred relics (as he terms them) gentle whiſpers, and the breath of better times, that from the tradition of more ancient nations, came at length into the flutes and trumpets of the Greeks. He concludes, that the knowledge of the early ages was either great or happy: great, if they by deſign made this uſe of trope and figure; or happy, if, whilſt they had other views, they afforded matter and occaſion to ſuch noble contemplations.

N.

N The thirteenth letter, and tenth conſonant of our alphabet: it is a liquid, the ſound of which is formed by forcing the voice ſtrongly through the mouth and noſtrils; being at the ſame time intercepted by applying the tip of the the tongue to the fore-part of the palate, with the lips open. It ſuffers no conſonant immediately after it, in the beginning of words and ſyllables; nor any before it, except *g*, *k*, and *s*; as in *gnaw*, *know*, *ſnow*, &c.

As a numeral, N ſtands for 900; and with a daſh over it, thus N̄, for 900,000.

N. or N°. ſtands for *numero*, i. e. in number; and N. B. for *nota bene*, note well, or obſerve well.

Among the ancient Romans, N. denotes Nepos, Nonnius, &c. N. C. Nero Cæſar, or Nero Claudius; N. L. Non Liquet; N. P. Notarius Publicus; and N B L. ſtands for nobilis.

NADIR, in aſtronomy, that point of the heavens which is diametrically oppoſite to the zenith, or point directly over our heads.

The zenith and nadir are the two poles of the horizon. See HORIZON and POLE.

Sun's NADIR, in aſtronomy, is the axis of the cone formed by the earth's ſhadow: it is thus called, becauſe being produced, it gives a point in the ecliptic diametrically oppoſite to the ſun.

NAHUM, or *the Prophecy of* NAHUM, a canonical book of the Old-Teſtament.

Nahum, the ſeventh of the twelve leſſer prophets, was a native of Elkoſhai, a little village of Gallilee. The ſubject of his prophecy is the deſtruction of Nineveh, which he deſcribes in the moſt lively and pathetic manner; his ſtile is bold and figurative, and can hardly be exceeded by the moſt perfect maſters of oratory. This prophecy was verified at the ſiege of that city by Aſtyages, in the year of the world 3378, 622 years before Chriſt.

The time of Nahum's death is unknown: the Greek menologies, and the Latin martyrologies, place his feſtival on the firſt of December.

NAIADS, in mythology, the nymphs of the fountains. See NYMPH.

NAJAS, in botany, a genus of plants, the male corolla of which is monopetalous, and divided into four ſegments at the limb: the female one has no flower-petals: the fruit is an oval capſule, containing ovato-oblong ſeeds.

NAIL, *Unguis*, in anatomy, a kind of bony excreſcence, growing on the fingers and toes of men, and ſeveral other animals.

The number, figure, ſize, and colour of the nails, need no explanation. The ſeveral parts of the nails have their ſeveral names: the extremity is called the apex; the oppoſite part of this is the root or baſe; near which there is a white part, called the lunula, from its figure ſomewhat reſembling a ſegment of a circle.

As to the ſubſtance of the nails, they are compoſed of the cutaneous papillæ, elongated and indurated, and firmly connected to one another in a longitudinal direction; for this reaſon, they are very ſenſible at the roots, where theſe papillæ are yet tender; but at the apex, where they are perfectly indurated, they may be cut without pain.

The papillæ, of which the nails are formed, ariſe out of the ſkin, not only at the root of the nail, but all over the greater part of its under ſurface. It is by this means, that the nails are ſo firmly connected to the ſkin; and it is owing to the continual acceſſion of more and more papillæ, as they approach towards the apex, that they become harder and firmer in that part. They may eaſily be ſeparated intire, from dead ſubjects, by hot water.

Nails, in building, &c. ſmall ſpikes of iron, braſs, &c. which being drove into wood, ſerve to bind ſeveral pieces together, or to faſten ſomething upon them.

Nail, is alſo a meaſure of length, containing the ſixteenth part of a yard.

NAKED, in architecture, is the ſurface or plane from whence the projectures ariſe, or which ſerves as a ground to the projectures. Thus we ſay, the foliages of a capital ought to anſwer to the naked of a column, and that a pilaſter ought to exceed the naked of the wall by ſo many inches.

Naked Fire, in chemiſtry, is an open fire, or one where a veſſel is immediately expoſed to the fire.

Naked Seeds, in botany, are thoſe that are not incloſed in any pod or caſe.

NAMA, in botany, a genus of plants whoſe flower conſiſts of a pentaphyllous cup, and five ovate patent petals: the fruit is an oval bivalvular capſule, having one cell, which contains a great number of very ſmall ſeeds.

NAMUR-Marble, a name given by our artificers to a ſpecies of black marble, which is very hard, and capable of a good poliſh, but has no variegations of any other colour.

It is common in Italy, France, and Germany, and is the ſpecies called the lucullean marble by the Romans.

NAPE, a name uſed for the hind part of the neck, ſuppoſed to be on account of the ſhort hair growing there, in reſemblance of the nap of a cloth.

NAPHTHA, in natural hiſtory, a fluid mineral body, of a thin conſiſtance, bright and pellucid, of a ſtrong ſmell, very readily inflammable, and when pure, burning away without leaving any reſiduum.

NAPLES-Yellow, the common name in the colour-ſhops of London, and among our painters, for the ochre called Giallolino.

NARCISSUS, the daffodil, in botany, a genus of bulbous-rooted plants, the flower of which comes out of an oblong, obtuſe, compreſſed ſpatha, which opens on the ſide, and withers: the corolla conſiſts of a nectarium, formed of one leaf, of a cylindric or funnel ſhape, coloured at the top, and curled or plicated at the brim; and of ſix oval, acuminated, plane petals, affixed externally to the tube of the nectarium, above its baſe: the ſtamina are ſix ſubulated filaments, joined to the nectarium, but ſhorter; theſe are topped with oblong antheræ: the fruit is a roundiſh capſule, obtuſely trigonal, having three cells, which are filled with globoſe ſeeds.

There are various ſorts of the narciſſus; ſome of which are much admired for their ſweet ſcent. The roots are planted in autumn, and are frequently blown in glaſſes with water, in rooms, during the ſpring.

The root of the common daffodil is emetic, vulnerary, and detergent.

NARCOTICS, in medicine, ſoporiferous medicines, which excite a ſtupefaction.

Narcotics, called alſo hypnotics, anodynes, or ſtupefactives, are ſaid by Hoffman, to be ſuch kind of remedies as, by their ſubtile, noxious, and deleterious exhalations, diminiſh or quite deſtroy the ſenſe and motion of the ſolid parts. Among narcotics the moſt eminent are thoſe which are uſually prepared for medicinal uſes of the whole poppy, eſpecially opium; as alſo all thoſe prepared of mandragoras, hyoſcyamus, ſtramonium, and datura. Theſe, ſays the abovementioned author, are not without reaſon reckoned poiſons, ſince they exert their noxious influence in a ſhort ſpace of time, when taken in a ſmall quantity; and a quantity a little larger than ordinary proves mortal. Beſides, their principal operation is on the moſt noble parts of the body, which are the organs of ſenſe and motion; and moreover, they act by means of an element quite oppoſite to nature, a noiſome ſulphureous vapour, by which they diminiſh to a conſiderable degree, or quite deſtroy the ſenſe and motion of the motive fibres. The elements by which narcotics act, are of an highly volatile and penetrating nature, ſince they deeply inſinuate themſelves like a vapour into the pores of the membranes and nerves, and by contaminating that moſt pure and moveable fluid, deprive by little and little, the ſolids of their tone and motion.

Narcotics act on the nervous membranes of the ſtomach and inteſtines, principally by means of a vaporous and fetid ſulphur; for as the ſtomach and inteſtines firſt and immediately feel the force and efficacy of remedies, they are ſo much the more liable to ſuffer from the influence of medicines which are of a ſtronger and more penetrating nature than ordinary. Theſe medicines have alſo a mighty influence on the membranes of the brain, where, by greatly diminiſhing the ſpring and ſyſtole of the arteries, they cauſe ſtagnation of their blood therein, with diſtenſions of the veſſels of the head, by which means they induce a torpor, drowſineſs, deliriouſneſs, with frightful and troubleſome dreams. Theſe medicines were therefore ſuſpected, by the wiſeſt phyſicians among the antients, in the cure of diſeaſes, on account of their deleterious quality.

NARDUS, Spikenard, in botany, a genus of plants, the corolla whereof is formed of two valves; the exterior is long and of a lanceolato-linear figure; it terminates in an ariſta or awn, and contains within it the other, which is ſmaller, and terminates in a ſhorter awn: the ſeed is ſingle, of a linear oblong figure, narrower at top than at bottom, and pointed at each end; the corolla ſurrounds it by way of a pericarpium.

This plant is cephalic and ſtomachic; it is recommended in nephritic caſes, and as a promoter of the menſes. It is alſo given in chronic caſes to remove obſtructions of the viſcera: however, the modern practice does not uſe it much, except as an ingredient in ſome of the officinal compoſitions. It has a very fragrant aromatic ſmell and taſte.

NARRATION, in oratory and hiſtory, a recital or rehearſal of a fact as it happened, or when it is ſuppoſed to have happened.

Narration is of two kinds, either ſimple or hiſtorical, as where the auditor or reader is ſuppoſed to hear or read of a tranſaction at ſecond hand; or artifical and fabulous, as where their imaginations are raiſed, and the action is as it were re-acted before them. The narration, according to the writers of rhetoric, makes the ſecond part of a juſt ſpeech or harangue, *viz.* that immediately following to the exordium. It makes the whole hiſtory, abating for the occaſional reflections, epiſodes and digreſſions. Cicero requires four virtues in a narration, *viz.* perſpicuity, probability brevity and ſweetneſs. The narration is rendered perſpicuous by obſerving the order of time, by uſing none but proper and known terms, and by reciting the action uninterruptedly. It is rendered probable by the credibility of the narrator, by the ſimplicity and openneſs of the narration, by avoiding every thing far remote from the common ſenſe and opinion of mankind, and by a preciſe detail of circumſtances. It is rendered brief by taking it up no higher than is neceſſary, nor fetching it back; and by avoiding trivial circumſtances. Laſtly it is rendered ſweet by uſing ſmooth numerous, and well ſounding words; by arranging them ſo as to avoid any hiatus or claſhing; by the greatneſs, the novelty, and unexpectedneſs of the things related; and by enriching it with tropes and figures.

Narration, in poetry, is uſed for the action, or event, that make the ſubject of an epic poem.

NARWAL, in icthyology, the unicorn fiſh, ſo called from a long wreathed tooth, ten or more feet in length, which has more the appearance of a horn than a tooth; though it be really a tooth fixed in the gomphoſis of the upper jaw, altogether in the manner of other teeth: hence ſome have called it monodon, which is certainly a more proper name than that of the unicorn fiſh.

The narwal is a fiſh of the whale kind, often growing to twenty-five feet in length, but is more commonly found from ſixteen to twenty.

NASIAS, in anatomy, a thin bone making the upper part of the noſe. See the article Nose.

NATES, in anatomy, a term expreſſing thoſe two fleſhy exterior parts of the body, vulgarly called the buttocks.

Nates cerebri, two circular protuberances of the brain, ſituated on the back ſide of the medulla oblongata, near the cerebellum.

NATION, a collective term, uſed for a conſiderable people inhabiting a certain extent of land, confined within fixed limits, and under the ſame government.

NATIVE, a perſon conſidered as born in a certain place which was the proper reſidence of his parents, and where he received his education.

Native, or Nativus, in our ancient law-books, ſignifies a perſon born in the ſtate of villainage, in contradiſtinction to a bonds-man, or one who became a villain by his own act and deed.

NATIVITY, or Natal-Day, the day of a perſon's birth. The word nativity is chiefly uſed in ſpeaking of the ſaints, as the nativity of St. John the Baptiſt, *&c.* But when we ſay the Nativity, it is underſtood of that of Jeſus Chriſt, or the feaſt of Chriſtmas, See the article Christmas.

Nativity, in old law-books, ſignifies villainage or ſervitude.

Nativity, in aſtrology, the ſituation of the heavens, and particularly of the twelve houſes at the moment of a perſon's birth.

NATRUM, the nitre of the antients, in natural-hiſtory, is a genuine, pure and native ſalt, extremely different from our nitre, and indeed from all the other native ſalts; it being a fixt alkali, plainly of the nature of thoſe made by fire from vegetables, yet capable of a regular cryſtallization, which thoſe ſalts are not. It is found on the ſurface of the earth, or at very ſmall depths within it, and is naturally formed into thin and flat cakes or cruſts, which are of a ſpungy or cavernous ſubſtance, very light and friable, and when pure, of a pale browniſh white; but as its ſpungy texture renders it very ſubject to be fouled by earth received into its pores, it is often met with of a deep dirty-brown, and not unfrequently reddiſh.

NATURAL, in general, ſomething that relates to nature.

Natural-children are thoſe born out of lawful wedlock.

The naturul functions, are thoſe actions whereby the aliments are changed and aſſimilated ſo as to become a part of the body.

Natural History, a deſcription of the productions of the earth, air, water, *&c.*

Natural Inclinations, are the tendencies of our minds toward things ſeemingly good. See the articles Good and Passions.

Natural Philosophy, that which conſiders the powers and properties of natural bodies, and their mutual actions on one another.

The buſineſs of natural philoſophers, ſays Boerhaave, is to communicate a ſolid and accurate knowledge of all the bodies in being, and all the affections thereof. Nor can this ſcience be acquired otherwiſe than by obſerving, by means of our ſenſes, all the objects which the author of nature has made cognizeable thereto: hence the firſt and principal part of this ſcience is to collect all the manifeſt and ſenſible appearances of things, and reduce them into a body of natural hiſtory. Now there are two ways of making ſuch obſervations; the firſt when we view things nearly as they happen to turn up, without any deſign or intervention of our own; in which way no great improvements can be expected in the art, becauſe chance having here the direction, only exhibits occaſional or extemporary properties: the other method is, when, after a thorough acquaintance with bodies, we apply them to other bodies equally known, diligently attending to the reſult, and obſerving whether any thing new ariſes. See the article Experimental Philosophy.

Natural, in muſic, is a term variouſly uſed: thus natural muſic is the ſame with vocal, in oppoſition to artifical muſic, or that performed on inſtruments, A ſong is alſo called natural, when its notes move eaſily and gracefully, the voice or inſtrument being no wiſe forced or ſtrained. Natural harmony is that produced by the natural and eſſential chord of the mode.

A natural note is uſed to contradict thoſe flats and ſharps that are uſed at the beginning of a ſtave; and in ſuch caſe, it muſt be taken exactly as in the gamut.

Natural, in heraldry, is when animals, fruits, flowers, *&c.* are blazoned with their natural colours.

NATURALIST, a perſon well verſed in the ſtudy of nature, and the knowledge of natural bodies, eſpecially in what relates to animals, vegetables, metals, minerals, and ſtones. See the article Natural Philosophy.

NATURALIZATION, in law, the act of naturalizing an alien, or placing him in the condition of a natural born ſubject. In England, this is done by act of parliament; but none can be naturalized before they have received the ſacrament of the church, and taken the oaths of allegiance and ſupremacy. A perſon who is naturalized may have lands by deſcent, as heirs at law, as well as obtain them by purchaſe: but they are diſabled from being of the king's privy council, or of holding offices, 7 Jac. I. 12 W. III. c. 2. By a late ſtatute it is ordained, that all children born out of the king's dominions, whoſe fathers were or are natural ſubjects to this kingdom at the time of their birth, ſhall be adjudged natural-born ſubjects of this realm, except children of parents who are attainted of treaſon, or that are in the actual ſervice of a foreign prince at enmity with us. 4 Geo. II. c. 2. By an act of 13 Geo II. all Jews who have reſided in the Britiſh colonies in America, without being abſent two months at any one time, are declared naturalized without their receiving the ſacrament of the Lord's ſupper.

NATURALS, *res naturales*, among phyſicians, whatever naturally belongs to an animal, in oppoſition to non-naturals. See the article Non-naturals.

NATURE, *Natura*, according to Mr. Boyle, has eight different ſignifications; it being uſed, 1. For the author of nature, whom the ſchoolmen call *Natura Naturans*, being the ſame with God. 2. By the nature of a thing, we ſometimes mean its eſſence; that is, the attributes which make it what it is, whether the thing be corporeal or not; as when we attempt to define the nature of a fluid, of a triangle, &c. 3. Sometimes we confound that which a man has by nature, with what accrues to him by birth; as when we ſay, that ſuch a man is noble by nature. 4. Sometimes we take nature for an internal principle of motion; as when we ſay, that a ſtone by nature falls to the earth. 5. Sometimes we underſtand, by nature, the eſtabliſhed courſe of things. 6. Sometimes we take nature for an aggregate of powers belonging to a body, eſpecially a living one; in which ſenſe phyſicians ſay, that nature is ſtrong, weak, or ſpent; or that, in ſuch and ſuch diſeaſes, nature left to her ſelf will perform the cure. 7. Sometimes we uſe the term nature for the univerſe, or whole ſyſtem of the corporeal works of God; as when it is ſaid of a phœnix, or chimera, that there is no ſuch thing in nature. 8. Sometimes too,. and that moſt commonly, we expreſs by the word nature a kind of ſemi-deity, or other ſtrange kind of being.

If, ſays the ſame philoſopher, I were to propoſe a notion of nature, leſs ambiguous than thoſe already mentioned, and with regard to which many axioms, relating to that word, may be conveniently underſtood, I ſhould firſt diſtinguiſh between the univerſal and the particular nature of things. Univerſal nature I would define to be the aggregate of the bodies that make up the world, in its preſent ſtate, conſidered as a principle; by virtue whereof they act and ſuffer, according to the laws of motion, preſcribed by the author of all things. And this makes way for the other ſubordinate notion;

ſince the particular nature of an individual conſiſts in the general nature, applied to a diſtinct portion of the univerſe; or, which is the ſame thing, it is a particular aſſemblage of the mechanical properties of matter, as figure, motion, &c.

NAVAL, relating to a ſhip, whence

NAVAL ARMAMENT, the ſame with fleet of ſhips of war, which ſee.

NAVAL CAMP, in antiquity, a fortification, conſiſting of a ditch and parapet on the land ſide, or a wall built in the form of a ſemi circle, and extended from one point of the ſea to another. This was ſometimes defended with towers, and beautified with gates, through which they iſſued forth to attack their enemies. Homer hath left us a remarkable deſcription of the Grecian fortifications of this ſort in the Trojan war, of which we ſhall preſent our readers with Mr. Pope's tranſlation.

Then to ſecure the camp and naval pow'rs,
They rais'd embattled walls with lofty tow'rs;
From ſpace to ſpace were ample gates around,
For paſſing chariots, and a trench profound
Of large extent; and deep in earth below,
Strong piles infix'd ſtood adverſe to the foe.

Towards the ſea, or within it, they fixed great piles of wood, like thoſe in their artificial harbours; before theſe the veſſels of burthen were placed, in ſuch order, as that they might be inſtead of a wall, and give protection to thoſe within: in which manner Nicias is reported by Thucydides to have encamped himſelf. But this ſeems only to have been practiſed when the enemy was thought ſuperior in ſtrength, and raiſed great apprehenſions of danger in them.

When their fortifications were thought ſtrong enough to defend them from the aſſaults of enemies, it was frequent to drag their ſhips to ſhore, which the Greeks called ενωλκειν, the Romans *ſubducere*. Around the ſhips the ſoldiers diſpoſed their tents, as appears every where in Homer: but this ſeems only to have been practiſed in winter, when their enemies fleet was laid up, or could not aſſault them, or in long ſieges, and when they lay in no danger from their enemies by ſea, as in the Trojan war, where the defenders of Troy never once attempted to encounter the Grecians in a ſea-fight.

The adjacent places were uſually filled with inns and ſtews, well ſtocked with females, that proſtituted themſelves to the mariners, merchants, and artificers of all ſorts, who flocked thither in great numbers; this, however, appears to be only in times of peace.—*Potter's Antiquities of Greece.*

NAVE, in architecture, the body of a church, where the people are diſpoſed, reaching from the balluſter, or rail of the choir, to the chief door.

Some derive the word nave from *ναος*, a temple; and others from *ναυς*, a ſhip, by reaſon the vault or roof of a church bears ſome reſemblance to a ſhip.

NAVEL, *Umbilicus*, in anatomy, the center of the lower part of the abdomen; being that part where the umbilical veſſels paſſed out of the fœtus to the placenta of the mother.

The navel-ſtring, or funiculus umbilicalis, of the fœtus, beſides its vein and two arteries, is compoſed of a ſpongy ſubſtance, in which theſe veſſels are lodged, which upon entering the placenta, are divided into numerous branches, and leſſer ramifications.

As ſoon as the infant and after-burden are delivered, a firm ligature is made upon the navel-ſtring, with a ſtrong thread folded ſeveral times together, and about two or three fingers-breadth from the abdomen: this done, the navel-ſtring leading to the placenta is to be cut off, and the wound dreſſed with lint, till the part on which the ligature was made, becoming dry, falls off of itſelf.

NAVEL-WORT, *Cotyledon*, in botany. See the article COTYLEDON.

NAVEW, in botany. See the article RAPE-SEED.

NAVICULARE Os, in anatomy, a bone of the foot, lying between the aſtragalus and oſſa cuneiformia, and ſo called from its reſemblance to a boat.

It has a glenoid cavity, for its articulation with the head of the aſtragalus; and its anterior faces are received into the ſinuſes of the oſſa cuneiformia.

NAVIGATION, the art of conducting or carrying a ſhip from one port to another. See the article SHIP.

Navigation implies not only the mechanical art of managing the ſails, and working a ſhip; that is, of cauſing it to obſerve ſuch motions and directions, as are aſſigned by the navigator; which muſt be learned on ſhip-board, and in the practice of ſailing; but likewiſe the theory thereof, which depends on the navigator's being before-hand furniſhed with the following elements.

1. A table of the latitudes and longitudes of the moſt remarkable parts of the ſea-coaſts, iſlands, rocks, ſhoals, &c. in the frequented parts of the world.

2. Maps and charts of the ſeas and lands, together with the depths of water, and the times and ſetting of the tides upon the coaſt he may have occaſion to approach near.

3. The uſe and application of ſeveral inſtruments, neceſſary to point out the way a ſhip is to ſteer, to meaſure the rate ſhe runs at, and to find the place ſhe is in at any time.

4. A ſufficient ſtock of mathematical learning, to enable him to make a right uſe of the obſervations that may be deduced from the preceding elements; but particularly trigonometry. See the article TRIGONOMETRY.

NAVIS, *Argo Navis*, or the ſhip Argo, in aſtronomy. See the article ARGO.

NAUMACHIA, in antiquity, a ſhew or ſpectacle among the antient Romans, repreſenting a ſea-fight.

NAUSEA, in medicine, a reaching, or propenſity and endeavour to vomit, ariſing from a loathing of food, excited by ſome viſcous humour that irritates the ſtomach.

In this diſorder the patient is ſo far from deſiring aliment, that he rather loaths it. It either proceeds from a fault in the ſtomach, or elſe is derived from other diſeaſes, or is a ſymptom thereof, particularly acute inflammations, aſthma, dropſy, hypochondriac paſſion, &c. or when the humours are corrupted, and the ſpirits ſuppreſſed, in malignant diſeaſes. Vomiting in this caſe is proper, or purging when that is forbid. To theſe ſhould be joined ſtrengtheners of the ſtomach, and chiefly ſtomachic balſams, made of oil of nutmegs, and diſtilled oils, and ſtomachic plaſters. Hoffman ſays, that there is nothing better than mint, its ſpirituous water, and diſtilled oil; likewiſe maſtic and its ſpirit, or balſam of Peru diſtilled with ſalt of tartar. In acute fevers, eſpecially the malignant, epidemic, and ſpotted, there is generally a nauſea and reaching to vomit, for which reaſon emetics are good: likewiſe in the dyſentery, eſpecially when it is epidemic in a camp, emetics are not only uſeful, but neceſſary, with a ſlender diet.

NAUTICAL PLANISPHERE, a deſcription of the terreſtrial globe upon a plane for the uſe of mariners, more uſually called chart. See the article CHART.

NAUTICAL COMPASS, the ſame with mariners compaſs. See COMPASS.

NAUTICUS, in anatomy, is the name of a muſcle, called alſo tibialis poſticus. See the article TIBIALIS.

NAUTILUS, in natural hiſtory, a ſimple ſhell, having no hinge, formed of one continued piece, rolled as it were into a ſpiral form, and having its cavity divided into a great number of cells by tranſverſe partitions, each of which has a perforation, and is continuous to the others, by means of a ſyphunculus carried the whole length of the ſhell. The animal inhabiting this ſhell is a ſepia.

Of the nautili, ſome are thick and ſtrong; others thin, light, and brittle; ſome are aurated, others are not ſo; and ſome are ſmooth on the external ſurface, and others furrowed.

NAVY, the fleet or ſhipping of a prince or ſtate. See FLEET.

NAZAREANS, in church hiſtory, a name originally given to all Chriſtians in general, on account that Jeſus Chriſt was of the city of Nazareth; but afterwards reſtrained to a ſect of heritics, whoſe religion conſiſted of a ſtrange jumble of Judaiſm and Chriſtianity; obſerving at the ſame time the Moſaical law, and the ſeveral rites of the Chriſtian religion.

NAZARITES, among the Jews, perſons who, either of themſelves or by their parents, were dedicated to the obſervation of Nazariteſhip.

They were of two ſorts; namely, ſuch as were bound to this obſervance for only a ſhort time, as a week or month; or thoſe who were bound to it all their lives. All that we find peculiar in the latter's way of life, is, that they were to abſtain from wine, and all intoxicating liquors, and never to ſhave or cut off the hairs of their heads. The firſt ſort of Nazarites were moreover to avoid all defilement; and if they chanced to contract any pollution before the term was expired, they were obliged to begin afreſh. Women as well as men might bind themſelves to this vow.

NEALED, among ſea-men, is uſed when the ſounding is deep water cloſe to the ſhore; as alſo when the ſhore is ſandy, clayey, ooſy, or foul and rocky ground.

NEALING, or rather ANNEALING. See ANNEALING.

NEAP TIDES. See TIDES.

NEAPED. When a ſhip wants water ſo that ſhe cannot get out of the harbour, off the ground, or out of the dock, the ſea-men ſay, ſhe is neaped, or beneaped.

NEAR, or NO NEAR, at ſea, a word of command from him that cons the ſhip to the man at the helm, requiring him to let her fall to the leeward.

NEAT, or NET WEIGHT, the weight of a commodity alone, clear of the caſk, bag, caſe, or even filth.

NEBEL, in the Jewiſh antiquity, the ſame with the pſaltery. See PSALTERY.

NEBULOUS, cloudy, in aſtronomy, a term applied to certain of the fixed ſtars, which ſhew a dim hazy light; being leſs than thoſe of the ſixth magnitude, and therefore ſcarce viſible to the naked eye.

NEBULY, or NEBULEE, in heraldry, is when a coat is charged with ſeveral little figures, in form of words, running within one another; or when the outline of a bordure, ordinary, &c. is indented or waved.

NECESSARY, in a philoſophical ſenſe, that which cannot but be, or cannot be otherwiſe. See the next article.

NECESSITY, whatever is done by a neceſſary cauſe, or a power that is irreſiſtible, in which ſenſe it ſtands oppoſed to freedom. See the article FREEDOM.

The ſchools diſtinguiſh a phyſical neceſſity, and a moral neceſſity; and a ſimply abſolute neceſſity, and a relative one. Phyſical neceſſity, is the want of a principle, or of a natural means neceſſary to act, which is otherwiſe called a phyſical or natural impotence. Moral neceſſity, is only a great difficulty,

culty, ſuch as that ariſing from a long habit, a ſtrong inclination, or violent paſſion. Simple or abſolute neceſſity, is that which has no dependence on any ſtate or conjuncture, or any particular ſituation of things, but is found every where, and in all the circumſtances in which the agent can be ſuppoſed; ſuch as in a blind man, the neceſſity he is under of not diſtinguiſhing colours. Relative neceſſity, is that which places a man in a real incapacity of acting or not acting in thoſe circumſtances, and that ſituation he is found in, though in other circumſtances, and in another ſtate of things, he might act or not act; ſuch, in the opinion of the Janſeniſts, is the neceſſity of doing evil, in a man, who, with a violent paſſion, has only a feeble grace to reſiſt it; or the neceſſity of doing well, in a man, who, having grace of ſeven or eight degrees of ſtrength, has only concupiſcence of two or three degrees to withſtand. All theſe kinds of neceſſity are oppoſite to freedom, or liberty; ſince even in the laſt, it is as impoſſible for a man to act or not act, as if he were in a ſtate of abſolute and phyſical neceſſity.

The ſchoolmen admit of other ſpecies of neceſſity, antecedent, concomitant, conſequent, &c. Antecedent neceſſity, is that ariſing from an antecedent cauſe neceſſarily operating; ſuch is the neceſſity of the ſun's riſing to-morrow morning. Concomitant neceſſity, ariſes from the antecedent and neceſſary cauſe, but depends upon the circumſtances of the effect; the effect all the while being free: thus, it is neceſſary Peter ſit, ſuppoſing he is ſitting.

NECK, *Collum*, in anatomy, is that ſlender part ſituated between the head and the trunk of the body.

The neck conſiſts of the following parts: 1. the common integuments: 2. ſeven vertebræ: 3. a number of muſcles, which ſerve to move the head, the neck, the larynx, the pharynx, and the os hyoides: 4. a number of very large arteries, as the carotids, internal and external, and the vertebral ones: 5. of large veins, as the jugular, internal and external, and the vertebral ones: 6. of large nerves, of the par vagum, the intercoſtals, the recurrent, the diaphragmatics, and the vertebral: 7. a part of the ſpinal marrow: 8. the aſpera arteria, or trachea, particularly the larynx, in which is an eminence called the pomum adami: 9. the pharynx, with a part of the oeſophagus: 10. the thyroide, with ſome other ſmaller glands. See LARYNX, PHARYNX, JUGULAR, &c.

Wounds of the NECK. The treatment of theſe wounds ought to be different, according to the different nature of the wound. When the common integuments and muſcular fleſh only are wounded, it will require to be treated in the ſame manner as other ſlight wounds. See the article WOUND.

Where the external jugular is wounded, the methods uſed after bleeding in that vein will be ſufficient. When the internal jugular vein is wounded, the hæmorrhage will be eaſily ſtopped by filling the wound with dry lint, or with the puff-ball or duſty-muſhroom; laying over theſe applications ſquare bolſters, and ſecuring all with a bandage, drawn as tight as the ſituation of the place will admit. Where this method has no effect, the ſurgeon ſhould make a proper preſſure on the wounded part with his finger, till the hæmorrhage is intirely ſtopped; the dreſſings applied are not to be removed for three days, and then a vulnerary balſam and plaſter is to be applied to heal the wound. In large wounds, or an intire diviſion of the internal jugular, the ſurgeon, if preſent, ſhould make a firm preſſure with his finger on the wounded part, and make inciſions lengthwiſe above the wound, till he can get at the veſſel, and then make a firm ligature upon it, by the aſſiſtance of the crooked needle.

In caſe of a wound in the carotid artery, a ſurgeon, if preſent in time, ſhould uſe the ſame method as in thoſe of the internal jugular vein. This method is more likely to be attended with ſucceſs in wounds of the upper and middle part of the veſſel, than in thoſe of the lower part of it; and where the wound is not in the trunk of the artery, but in one of its branches near the head, you ſhould fill up the wound with lint dipt in ſome ſtyptic liquor, and then cover it up with thick compreſſes, ſecuring all with a tight bandage, and ordering an aſſiſtant to make a preſſure upon the part with his hand, for ſome time after: and in theſe caſes, the dreſſings are not to be removed till the third or fourth day.

In curing the wounds of the aſpera arteria, the ſurgeon ought to clean the wound, and then endeavour to unite the parts by the help of ſticking plaſters; or where the wound is large, by making two ſtitches with a crooked needle, dreſſing the wounds afterwards in the uſual manner, and enjoining the patient to keep his head in a proper ſituation. The wound thus treated, will eaſily heal, if it has been made either by puncture, or a cutting inſtrument; but if it has been made by a bullet, and any part of the aſpera arteria is carried away, the future is to no purpoſe: wounds of this kind are only to be dreſſed with the vulnerary balſams. If the aſpera arteria is intirely divided, and the lower end of it has ſhrunk into the cavity of the thorax, ſo that it cannot be laid hold on and united to the upper part, there can be no remedy.

When the oeſophagus is wounded, what is taken in at the mouth comes out through the wound, and the patient is uſually affected with hiccoughs and vomiting. When it is entirely divided, there is no remedy; but when it is only perforated, or wounded in part, the cure may be attempted, by dreſſing it with vulnerary balſams, endeavouring to unite it by means of ſticking plaſters, and enjoining the patient a ſtrict abſtinence for ſome days, giving nouriſhing clyſters of broth or milk; but when the ne-

neceſſities of nature require nouriſhment to be taken by the mouth, the wound ſhould always be carefully cleaned afterwards, and dreſſed daily till it heals.

Wounds of the medulla ſpinalis, are beſt dreſſed with balſam of Peru, or medicines of the like nature, mixed with a ſmall quantity of honey of roſes, ſpread upon pledgits, and applied moderately warm. Slight ones of this kind, are ſometimes healed by this means, but large ones in this part bring on certain death.

Luxation of the NECK. If life remain after ſuch an accident, the patient is to be immediately laid flat on the ground or floor; then the ſurgeon laying hold of his head, is to extend it ſtrongly, gently moving it from ſide to ſide, till he finds that the neck is reſtored to its natural poſture.

Mr. Petit mentions another method, by means of ſlings: but Heiſter gives the preference to the former method, both as being more ſimple, and becauſe the patient can be relieved much ſooner.

Wry NECK, a deformity uſually brought into the world with people; but ſometimes it is occaſioned by accidents afterwards.

When it is from birth, there is very little reaſon to imagine it curable, becauſe the vertebræ of the neck are rendered crooked by that poſture, while the bones are in a ſoft and pliable ſtate.

There are, however, in the writings of ſurgeons, ſome inſtances of this diſorder, even in theſe circumſtances, being cured after twelve, ſixteen, or eighteen years.

When this diſorder comes on adults, it is occaſioned generally by a contraction of the ſkin from a burn on one ſide, or from a ſtrong ſpaſmodic contraction of one of the maſtoide muſcles; which will at length become ſhorter and indurated, by continuing in that poſture; or it may proceed from a relaxation of one or more of theſe muſcles; in conſequence of which, the neck will be contracted by the ſtronger antagoniſt-muſcle on the oppoſite ſide; or, laſtly, it may proceed from a preternatural ligament drawing down the head. And when either of theſe is the occaſion of the diſorder, there is hopes of a cure; eſpecially if the patient be young, and the diſorder not of long ſtanding.

If this diſorder be recent, and cauſed by a defluxion of humours, evacuating medicines, with mild ſudorifics, and heat, may be of ſervice. But when it ariſes from a contraction of the ſkin or muſcles by burning, the repeated uſe of oils, ointments, and fomentations, may relax ſo far as to make a cure. A proper firm bandage muſt be applied to pull the head toward the natural poſture, and a ſteel collar may be contrived, by which the patient will be ſuſpended very frequently till the neck recover its proper poſition. But when all theſe fail, the manual aſſiſtance of the ſurgeon is to be called in.

If the ſkin is contracted by a burn, it muſt be carefully incided tranſverſely in ſeveral places, and the inciſions dreſſed ſo as to keep them open and dilated, and the head pulled to its proper poſition by a bandage, till the new fleſh filling up theſe inciſions, gives room for the head to ſtand even.

But if the wry-neck proceeds from a contraction of one of the maſtoide muſcles, or from ſome ligament, they are to be divided by a tranſverſe inciſion in their lower part, near the clavicle or ſternum.

NECROMANCY, a ſpecies of divination, performed by raiſing the dead, and extorting anſwers from them.

NECROSIS, in medicine, a term ſometimes uſed for a mortification, or ſphacelus.

NECTAR, νεκταρ, among ancient poets, the drink of the fabulous deities of the heathens, in contradiſtinction from their ſolid food, which was called ambroſia. See AMBROSIA.

This word is alſo uſed by ſome of the ancients to expreſs honey.

NECTARINE, a well-known fruit, only differing from the peach by having a ſmoother rind and a firmer pulp.

For the management of nectarine-trees, and their generical characters, ſee the article PEACH.

NECTARIUM, among botaniſts, expreſſes what is ſometimes only a part of the corolla, and ſometimes, though more rarely, the whole: it is a part deſtined for the reception of the honey-juice of the plant, and is very various in its figure; being ſometimes only a hollow in a petal, ſometimes a little ſquama or tubercle, and ſometimes only a plain tube.

NEEDLE, *Acus*, a very common little inſtrument or utenſil, made of ſteel, pointed at one end, and pierced at the other; uſed in ſewing, embroidery, tapeſtry, &c.

Needles make a very conſiderable article in commerce, though there is ſcarce any commodity cheaper, the conſumption of them being almoſt incredible. The ſizes are from N°. 1. the largeſt, to N°. 25. the ſmalleſt.

Chirurgeon's NEEDLE. There are many caſes wherein the uſe of the needle is highly neceſſary; in ſome of which, a cure cannot be completed without it, as in wounds of the belly, and in divided tendons.

In amputations they are found much preferable to the actual cautery; and in the operation of the aneuriſm, bubonocele, lithotomy, &c. they very much forward the cure; and in a cataract and harelip, the cure is wholly performed by them.

For a deſcription of the different needles uſed in the cure of each of theſe two laſt diſorders, ſee the articles COUCHING and HARE-LIP.

Chirurgical needles are of different figures and ſizes; being ſtraight, crooked, and flat; and all of them very ſharp, and moſtly made of well-tempered metal. Thoſe needles uſed for ſetons, and generally for the future of tendons, and for the ſewing up of dead bodies, muſt be ſtraight. In amputation, and all other ſort of wounds, the crooked ſort are uſed.

Mr. Monro, in the Medical Eſſays, obſerves, that needles of ſilver pierce more eaſily in ſtitching arteries, after amputation, than thoſe made of ſteel.

Magnetical NEEDLE, in navigation, a long ſlender bar of ſteel, ſupported upon a ſmall pivot, or center; on which, playing at liberty, it directs itſelf to certain points in or under the horizon; whence the magnetical needle is of two kinds, viz. horizontal, and inclinatory. See the article MAGNET.

Horizontal needles are thoſe equally balanced on each ſide the pivot that ſuſtains them; and which, playing horizontally with their two extremes, point out the north and ſouth points of the horizon. For their application and uſe, ſee the article COMPASS.

In the conſtruction of the horizontal needle, a piece of pure ſteel is provided, of a length not exceeding ſix inches, leſt its weight impede its volubility, very thin, to take its verticity the better, and not pierced with any holes, or the like, for ornament ſake, which prevent the equable diffuſion of the magnetic virtue. A perforation is then made in the middle of its length, and a braſs cap or head ſoldered on, whoſe inner cavity is conical, ſo as to play freely on a ſtyle or pivot headed with a fine ſteel point. The north point of the needle in our hemiſphere, is made a little lighter than the ſouthern; the touch always deſtroying the balance, if well adjuſted before, and rendering the north end heavier than the ſouth, and thus occaſioning the needle to dip.

The method of giving the needle its verticity or directive faculty, has been ſhewn already under the article MAGNET; but if after touching, the needle be out of its equilibrium, ſomething muſt be filed off from the heavier ſide, till it balance evenly.

Needles in ſea-compaſſes are uſually made of a rhomboidal or oblong form: we have given their ſtructure already under the article COMPASS.

The needle is not found to point preciſely to the north, except in very few places, but deviates from it more or leſs in different places, and that too at different times, which deviation is called its declination or variation from the meridian. See the article VARIATION.

Dipping-NEEDLE, a magnetical needle, ſo hung as that, inſtead of traverſing horizontally and pointing out north and ſouth, one end dips or inclines to the horizon, and the other points to a certain degree of elevation above it.

Or a dipping-needle may be defined, with Mr. Whiſton, to be a long ſtraight piece of ſteel, every way poiſed on its center, and afterwards touched with a loadſtone, but ſo contrived as not to play on the point of a pin, as does the common horizontal needle, but to ſwing in a vertical plane, about an axis parallel to the horizon; and this to diſcover the exact tendency of the power of magnetiſm. See DIPPING-*Needle*.

NEEDLE-FISH, a ſpecies of ſyngnathus, with the middle of the body hexangular, and the tail pinnated.

NEEDLE-SHELL, in natural hiſtory, the ſlender turbo, with ventricoſe ſpires, and a ſmall round mouth.

NEGATION, in logic, an act of the mind, affirming one thing to be different from another; as that the ſoul is not matter.

NEGATIVE, in general, ſomething that implies a negation: thus we ſay, negative quantities, negative ſigns, negative powers, &c.

Our words and ideas, ſays Dr. Watts, are ſo unhappily linked together, that we can never know which are negative, which poſitive ideas, by the words that expreſs them: for ſome poſitive terms denote a negative idea, as *dead*; and there are both poſitive and negative terms invented to ſignify the ſame and contrary ideas, as *unhappy* and *miſerable*. To this may alſo be added, that ſome words, which are negative in the original language, ſeem poſitive in Engliſh, as *abyſs*. The way, therefore, to know whether any idea be negative or not, is to conſider whether it primarily implies the abſence of any poſitive being, or mode of being; if ſo, then it is a negative idea, otherwiſe a poſitive one.

According to logicians, the only way to prove a negative, is by converting it into an affirmative.

NEGATIVE PREGNANT, a negative that implies or brings forth an affirmative; as where a perſon is impleaded to have done a certain thing on ſuch a day, &c. and denies the thing generally, without alledging any thing farther; it is a negative pregnant plea, becauſe ſuch plea may nevertheleſs imply that he did it in ſome ſort.

NEGROES, properly the inhabitants of Nigritia in Africa, alſo called blacks and moors; but this name is now given to all the blacks.

The origin of the negroes, and the cauſe of this remarkable difference from the reſt of the human ſpecies, has much perplexed the naturaliſts: Mr. Boyle has obſerved, that it cannot be produced by the heat of the climate: for though the heat of the ſun may darken the colour of the ſkin, yet experience does not ſhew that it is ſufficient to produce a true blackneſs, like that of the negroes.

In Africa itſelf, many nations of Ethiopia are not black, nor were there any blacks originally in the Weſt-Indies. In many parts of Aſia, under the ſame parallel with the African region, inhabited by blacks, the people are but tawney. He adds, that there are negroes in Africa beyond the ſouthern tropic, and that a river ſometimes parts nations, one of which is black and the other only tawney. Dr. Barriere alledges, that the gall of negroes is black, and being mixed with their blood, is depoſited between their ſkin and ſcarf-ſkin. However, Dr. Mitchel, of Virginia, in the Philoſophical Tranſactions, N°. 476, has endeavoured, by many learned arguments, to prove, that the influence of the ſun in hot countries, and the manner of life of their inhabitants, are the remote cauſes of the colour of negroes, Indians, &c. and indeed it would be a ſtrong confirmation of his doctrine, if we could ſee any people originally white, become black and woolly by tranſplantation, or *vice verſa*.

Negroes are brought from Guinea, and other coaſts of Africa, and ſent into the colonies in America, to cultivate tobacco, ſugar, indigo, &c. and in Mexico and Peru, to dig in the mines; and this commerce, which is ſcarce defenſible on the foot either of religion or humanity, is now carried on by all the nations that have ſettlements in the Weſt Indies. Thoſe negroes make the beſt ſlaves, who are brought from Angola, Senegal, Cape Verd, the river Gambia, the kingdoms of Joloffes, Daniel, Galland, &c.

There are various ways of procuring them: ſome, to avoid famine, ſell themſelves, their wives, and children, to their princes, or other great men; others are made priſoners of war; and great numbers are ſeized in excurſions made for that very purpoſe by the petty princes upon one another's territories, in which it is uſual to ſweep away all, without diſtinction to age or ſex.

NEHEMIAH, a canonical book of the Old Teſtament, ſo called from the name of its author. Nehemiah was born at Babylon, during the captivity, and ſucceeded Ezra in the government of Judah and Jeruſalem. He was a Jew, and was promoted to the office of cup bearer to Artaxerxes Longimanus, king of Perſia; when the opportunities he had of being daily in the king's preſence, together with the favour of Eſther the queen, procured him the favour of being authorized to repair and fortify the city of Jeruſalem, in the ſame manner as it was before its deſtruction by the Babylonians. On his going to Jeruſalem, he finiſhed the rebuilding of the walls in fifty-two days, and dedicated the gates of the city with great ſolemnity. He then reformed ſome abuſes which had crept in among his countrymen, particularly the extortion of the uſurers, by which the poor were ſo oppreſſed as to be forced to ſell their lands and children for ſupport: after which he returned to Perſia, and came back again with a new commiſſion, by virtue of which he regulated every thing relating both to the ſtate and religion of the Jews. The hiſtory of theſe tranſactions is the ſubject of this book.

NEMÆAN GAMES, were ſo called from Nemæa, a village between the cities of Cleonæ and Philus, where they were celebrated every third year. The exerciſes were chariot-races, and all the parts of the pentathlum. Theſe games were inſtituted in memory of Opheltes, or Archemorus, the ſon of Euphetes and Creuſa, and nurſed by Hypſipyle; who leaving him in a meadow, while ſhe went to ſhew the beſiegers of Thebes a fountain, at her return found him dead, and a ſerpent twined about his neck: whence the fountain, before called Langia, was named Archemorus; and the captains, to comfort Hypſipyle, inſtituted theſe games. Others aſcribe their inſtitution to Hercules, after his victory over the Nemæan lion.

NENIA, or NÆNIA, in ancient poetry, a mournful kind of ſong, filled with the praiſes of ſome deceaſed perſon, and ſung during the celebration of the funeral. See the article FUNERAL.

NEOMENIA, or NOUMENIA, a feſtival of the ancient Greeks, at the beginning of every lunar month, which was, as the name imports, obſerved upon the day of the new-moon, in honour of all the gods, but eſpecially Apollo, who was called Neomenios; becauſe the ſun is the fountain of light, and whatever diſtinction of times and ſeaſons may be taken from other planets, yet they are all owing to him as the original of thoſe borrowed rays by which they ſhine.

NEOPHYTES, new plants, a name given by the ancient Chriſtians to thoſe heathens who had newly embraced the faith; ſuch perſons being conſidered as regenerated, or born anew by baptiſm.

The term neophytes has been alſo uſed for new prieſts, or thoſe juſt admitted into orders, and ſometimes for the novices in monaſteries. It is ſtill applied to the converts made by the miſſionaries among the Infidels.

NEOTTIA, bird's neſt, in botany, a genus of plants, the flower of which conſiſts of five ovato-oblong petals, connivent at the points: the nectarium is undivided, equal in length to the petals, and furniſhed with a denticulation on each ſide: the fruit is a rugoſe oblong capſule, containing a great number of ſeeds.

NEPA, the leſſer furz, in botany, a ſpecies of geniſta ſpartium.

NEPENTHES, in botany, a genus of plants, whoſe flower is apetalous; the calyx is divided into four ſegments, and the filaments are ſcarce viſible, the antheræ joining to the top of the ſtyle. The fruit is an oblong, columnar, truncated capſule, having four cells, which contain a number of chaffy acuminated ſeeds.

NEPER'S RODS, or BONES, an inſtrument invented by J. Neper, baron of Marchiſton, in Scotland, whereby the multiplication and diviſion of large numbers are much facilitated.

NEPETA, the tall white ſideritis, or catmint, in botany, a genus of plants, the corolla whereof conſiſts of a ſingle ringent petal, the tube is cylindric and incurvated, and the limb dehiſcent; the faux is patent, cordated, and terminating in two ſhort ſegments; the upper lip is erect, roundiſh, and emarginated; the lower one is a roundiſh, concave, large, entire and ſerrated; there is no pericarpium, but the ſeeds, which are roundiſh, and four in number, are contained in the cup.

Catmint has been greatly recommended as an uterine and nervous medicine. The people in the country ſtill frequently uſe it in form of an infuſion for theſe purpoſes, but in the ſhops it is only kept as an ingredient in ſome compoſitions.

NEPHEW, a term relative to uncle and aunt, ſignifying a brother's or ſiſter's ſon; who, according to the civil law, is in the third degree of conſanguinity, but according to the canon in the ſecond.

NEPHRITIC, ſomething that relates to the kidneys. See kidneys.

Nephritic Stone, *Lapis Nephriticus.* See Stone.

Nephritic Wood, *Lignum Nephriticum*, a wood of a very denſe and compact texture, and of a fine grain, brought us from New Spain, in ſmall blocks, in its natutal ſtate, and covered with its bark. It is to be choſen of a pale colour, ſound, and firm, and ſuch as has not loſt its acrid taſte; but the ſureſt teſt of it is the infuſing it in water: for a piece of it infuſed half an hour in cold water, gives it a changeable colour; which is blue or yellow, as variouſly held to the light. If the vial it is in be held between the eye and the light, the tincture appears yellow; but if the eye be placed between the light and the vial, it appears blue. We often meet with this wood adulterated with others of the ſame pale colour; but the duſkiſh black hue of the bark, is a ſtriking character of this.

The tree is the coatli of Hernandez. It grows to the height of our pear-tree, and its wood, while freſh, is much of the ſame texture and colour; the leaves are ſmall and oblong, not exceeding half an inch in length, or a third of an inch in breadth; the flowers are ſmall, and of a pale yellow, and oblong ſhape, ſtanding in ſpikes; the cups they ſtand in are divived into five ſegments at the edge, and are covered with a reddiſh down. This is the beſt deſcription of the tree that can be collected from what has been hitherto written of it; no body having had an opportunity of taking its true characters.

This wood is a very good diuretic, and is ſaid to be of great uſe with the Indians in all diſeaſes of the kidneys and bladder, and in ſuppreſſions of urine, from whatever cauſe. It is alſo recommended in fevers and obſtructions of the viſcera. The way of taking it, among the Indians, is only an infuſion in cold water.

Nephritics, in pharmacy, medicines proper for diſeaſes of the kidneys, eſpecially the ſtone. See Stone. Such particularly are the roots of althæa, dog's-graſs, aſparagus, ſago, pellitory of the wall, mallows, pimpinella, red chick-peaſe, peach-kernels, turpentine, the nephritic wood, &c. and diuretics. See diuretics, &c.

NEPHRITIS, in medicine, an inflammation of the kidneys.

The ſymptoms of the Nephritis, according to Boerhaave, are a great inflammatory, pungent, burning pain in the place where the kidneys are ſituated, attended with a fever. The urine is made often, but ſmall in quantity, and very red, or flame-coloured; yet, in the higheſt degree of the diſeaſe, watery. There is a numbneſs of the thigh, a pain in the groin, and the teſticle of the ſame ſide, a pain in the ilium, bilious vomiting, and continual eructations.

When the inflammation is deep, ſays Hoffman, the fever violent, the burning pain in the loins laſting, the difficulty of making water great, the body very coſtive, the anxiety and ſtraitneſs of the precordia exquiſite, the urine crude and white, and finally, when the pain continues to the fourteenth day, the kidney will ſuppurate, which is known from the abatement of the pain, and from the thick, purulent ſediment of the urine. This will ſometimes laſt ſeveral years, till there is nothing left of the kidney but a bag. This is attended with a hectic fever, and the patient before he dies is almoſt reduced to a ſkeleton. If the bag happens to burſt, it brings on a retention of urine, and intolerable pains, which end in death.

When the diſeaſe is favourable, it is cured, according to Boerhaave, by reſolution, or a copious red and thick urine diſcharged at one time; or, by a large flux of blood from the hæmorrhoidal veins, in the beginning of the diſeaſe. It is cured alſo by plentiful bleeding, revulſion, and dilution; and by ſoft emollient, antiphlogiſtic decoctions. Hoffman thinks emollient clyſters without any ſaline or purging ſtimulus, the principal help in this diſeaſe. They may be made of milk, whey, or ſoft water, in which elder and camomile-flowers have been boiled; to which add an ounce or two of ſyrup of marſh-mallows, and a dram of nitre. The body ſhould be kept open with oil of ſweet almonds; and wind in the bowels ſhould be diſcuſſed; for which purpoſe cumin ſeeds made into comfits are proper. When there are convulſions, or exceſſive pains, Boerhaave ſays, that opiates are proper; and that, if the vomiting, a ſymptom of this diſeaſe, is too frequent, warm water ſweetened with honey, is beneficial. The patient ſhould avoid all acrimonious aliment; he ſhould neither lie too hot, nor on his back. By this method likewiſe, a nephritis ariſing from a ſtone in the kidneys, or ureters, may be cured. When an abſceſs is formed, the medicines muſt be powerfully maturating and emollient.

When the urine appears purulent, they muſt be diuretics of medicated waters, whey, and the like, together with balſamics. In this caſe, Hoffman recommends emulſions of the four cold ſeeds, and ſweet almonds; ſome attribute a great virtue to cherry-tree gum diſſolved in whey and water, and taken often. A ſyrup of marſh-mallows is very uſeful; add to theſe the decoction of veronica, ſweetened with honey, mixt with powder of nutmegs.

Arbuthnot ſays, that butter-milk, not very ſour, has been reckoned a great ſecret in ulcers of the kidneys; and that chalybeat waters have been beneficial to ſome: he ſays, that ſpruce-beer is a good balſamic in this caſe, and adviſes ſoft malt liquors rather than wine. If the diſeaſe ends in a ſchirrous, there will be a palſey, or a lameneſs of the adjacent thigh, ſays Boerhaave, as alſo an incurable evil; whence will proceed a renal tabes. When there is a ſudden remiſſion of the pain, a cold ſweat, a weak intermitting pulſe, hiccoughing, a ſtoppage of urine; or when it is livid, black, full of hairs, fetid, abounding with brown or black caruncles, and a ſudden loſs of ſtrength, there is a mortal gangrene.

NEPOTISM, a term uſed in Italy, in ſpeaking of the authority which the popes nephews and relations have in the adminiſtration of affairs, and of the care the popes take to raiſe and enrich them. Many of the popes have endeavoured to reform the abuſes of nepotiſm, which at preſent is ſaid to be aboliſhed.

NERIUM, the oleander, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped; the tube is cylindrical, the limb is large, and divided into five broad obtuſe ſegments, which are oblique; a ſhort nectarium terminates the top of the tube, which is torn into hairy ſegments; the ſtamina are five very ſhort ſubulated filaments, topped with arrow-ſhaped antheræ, and join together. The fruit is two long ſubulated pods, which are filled with oblong ſeeds placed in an imbricated order, and crowned with down. The common oleander is preſerved in our green-houſes in winter; it flowers in July and Auguſt, and makes an agreeable appearance. Another ſpecies, commonly called the double oleander, is very beautiful; but being tender, requires a hot-houſe to preſerve it; they are eaſily propagated by laying down their branches in the ſummer.

NERVES, *Nervi*, in anatomy, are cylindrical whitiſh parts, uſually fibroſe in their ſtructure; or compoſed of cluſters of filaments, ariſing from the brain, or rather from its medulla oblongata within the ſkull, and from the ſpinal marrow, and running from thence to every part of the body.

Structure and Uſe of the NERVES. This is eaſily perceived in moſt of the larger, and ſome of the ſmaller ones: for beſides the blood-veſſels they receive, and the membranes they are ſurrounded with, they are ſeen to be compoſed of a fibrous matter; or, as it were, of bundles or cluſters of white, cylindrical, and very ſlender filaments; which, on the ſtricteſt examination, appear to be ſolid, and without any cavity. Liewenhoeck indeed affirms, that he had often found a cavity in them; but he is not free from errors in many of his microſcopical obſervations. But though we cannot diſcover any cavity, much leſs a fluid in them; yet it is very poſſible that there may be ſuch cavities, and ſuch a fluid, only too ſmall to be perceived by us: and for the actual exiſtence of ſuch a fluid, known by the name of animal ſpirits, many probable arguments are adduced.

The great uſe of the nerves, therefore, though we are not able perfectly to demonſtrate it, ſeems to be to convey to all parts of the body a fluid of an extremely ſubtile kind, ſecreted in the brain and ſpinal marrow, and deſtined for no leſs noble a purpoſe than the ſenſation, motion, and nutrition of the ſeveral parts of the whole human fabric.

The ancients found, that by cutting, tying, or compreſſing any nerve, or any other way intercepting its communication with the brain, the parts to which it belonged were immediately deprived of all ſenſe and motion. One remarkable inſtance of this is, the making an animal dumb by tying the nerves near the wind pipe. We read in Galen, of a boy who became quite dumb by having both the recurrent nerves divided. The experiment of cutting theſe nerves in brute animals, was repeated and confirmed by Veſalius; and Dr. Martin aſſures us, he tried it ſucceſsfully on a pig; nor did the animal recover its voice, as ſome have ſuſpected it might. As the voice depends on a proper aperture of the glottis, it ſeems likely that, when the recurrent nerves are cut, the glottis will always ſtand open, and be incapacitated from being ſhut at the will of the animal. An anonymous phyſician offers what he calls an experimentum crucis, in proof of the nerves being compoſed of cylindrical canals, containing a fluid: it is the demonſtration of the optic nerve inflated and dried, which appears canular to the naked eye.

Wounds of the NERVES. Upon the diviſion of a nerve, Heiſter obſerves, that the limb to which that nerve was extended becomes inſtantly rigid, void of ſenſation, and withers: ſo that it is no wonder that a man inſtantly expires, upon the diviſion of thoſe nerves which are ſent to the heart or diaphragm: a wound is alſo attended with great danger where the nerve is partially wounded, and not entirely divided; for the wounded fibres contract themſelves, and thoſe which remain undivided ſuffer too great an extenſion, which will bring on moſt violent pains, ſpaſms, convulſions, inflammations, and gangrenes, and ſometimes death itſelf.

NESTORIANS, a Chriſtian ſect, the followers of Neſtorius, biſhop and patriarch of Conſtantinople; who, about the year 429, taught that there were two perſons in Jeſus Chriſt, the divine and the human, which are united, not hypoſtatically or ſubſtantially, but in a myſtical manner: whence he concluded, that Mary was the mother of Chriſt and not the mother of God. For this opinion, Neſtorius was condemned and depoſed by the council of Epheſus; and the decree of this council was confirmed by the emperor Theodoſius, who baniſhed the biſhop to a monaſtery.

Thoſe Chriſtians who at this day are called Neſtorians and Chaldeans, are very numerous, and are ſpread over Meſopotamia, and along the river Tigris and Euphrates: they are even got into the Indies, and into Tartary and China. Thoſe of India ſettled there under a Neſtorian prieſt called John, who, in the year 1145, got himſelf declared king of Indoſtan, and grew very famous under the name of Preſter John. The Neſtorians, though they ſpeak the language of the reſpective countries, only officiate in the Chaldee or Syriac tongue. The Neſtorian monks are habited in a black gown tied with a leathern girdle, and wear a blue turban. The nuns are dreſſed much after the ſame manner, excepting that they tie a kind of black veil about their heads and about their chins. They muſt be forty years old before they take the monaſtic habit.

NET, a device for catching fiſh and fowl.

The taking fowls by nets, is the readieſt and moſt advantageous of all others, where numbers are to be taken. The making the nets is very eaſy, and what every true ſportſman ought to be able to do for himſelf. All the neceſſary tools are wooden needles, of which there ſhould be ſeveral of different ſizes, ſome round and others flat: a pair of round-pointed and flat ſciſſars, and a wheel to wind off the thread. The packthread is to be of different ſtrength and thickneſs, according to the ſort of birds to be taken; and the general ſize of the meſhes, if not for very ſmall birds, is two inches from point to point. The nets ſhould neither be made too deep nor too long, for they are then difficult to manage; and they muſt be verged on each ſide with twiſted thread. The natural colour of the thread is too bright and pale, and is therefore in many caſes to be altered. The moſt uſual colour is the ruſſet, which is to be obtained by plunging the net after it is made, into a tanner's pit, and letting it lie there till it be ſufficiently tinged: this is of a double ſervice to the net, ſince it preſerves the thread as well as alters the colour. The green colour is given by chopping ſome green wheat and boiling it in water, and then ſoaking the net in this green tincture. The yellow colour is given in the ſame manner with the decoction of celandine, which gives a pale ſtraw-colour, which is the colour of ſtubble in the harveſt-time. The brown nets are to be uſed on ploughed lands, the green on graſs grounds, and the yellow on ſtubble lands.

NETTINGS, among ſeamen, a ſort of grating formed of cordage faſtened regularly together at equal diſtances, ſo as to reſemble a net; they are fixed on the quarter-rails, the intervals of which they fill up, being partly for ornament and partly for uſe; as to prevent any body on the deck from tumbling over-board, as the ſhips rocks from ſide to ſide. In a ſhip of war they have double rows of nettings, about eighteen inches diſtant from each other, theſe are ſupported by ſmall iron pillars, called ſtanchions, and the vacancy between is filled up with the hammocks and bedding of the ſailors, to ſerve as a fence in the time of action. The fore-caſtle and the tops of large ſhips are alſo generally furniſhed with nettings.

NETTLE, *Urtica*, in botany, a genus of plants, producing male and female flowers; the male flowers, inſtead of petals, have a ſmall nectarium placed in the center, with four filaments topped with bilocular antheræ. The female flowers have no corolla; the germen is oval, and the ſtigma hairy: the ſeed is ſingle, oval, and obtuſely compreſſed, and placed in the cup. There are ſeveral kinds of nettles, as the common nettle, the leſſer ſtinging-nettle, the Roman nettle, &c. The juice of this plant is recommended to ſtop ſpitting of blood, and other hæmorrhages; the leaves are diuretic, and good in the gout, rheumatiſm, ſtone, and gravel; and are frequently uſed in the ſpring to cleanſe and purify the blood. The ſeeds and roots of nettles are ſaid to be a good remedy againſt the jaundice, and to promote expectoration in coughs, as well as in the aſthma and pleuriſy.

Dead NETTLE, *Lamium*, in botany. See the article LAMIUM.

NETTLE-TREE, *Celtis*, in botany. See the article CELTIS.

NEURADA, in botany, a genus of plants, the flower of which conſiſts of five equal petals, and its fruit is an orbiculated depreſſed capſule, convex on the under part, and every where armed with aſcending prickles: it contains ten cells, in each of which is a ſingle ſeed.

NEUTER, or NEUTER-GENDER, in grammar, one of the three genders of nouns, ſo called as being neither maſculine nor feminine. See the article GENDER.

NEUTER-VERBS. See the article VERB.

NEUTRAL-SALTS, among chemiſts, a ſort of ſalts neither acid nor alkaline, but partaking of the nature of both. See the articles ACID and ALKALI.

NEUTRALITY, the ſtate of a perſon or thing that is neuter, or that takes part with neither ſide.

NEW-MOON, *Neomenia*, ſtrictly ſpeaking, is the ſtate of the moon a little after her conjunction with the ſun; though it is often uſed for the conjunction itſelf. See MOON and NEOMENIA.

NEWEL, in architecture, is the upright poſt which a pair of winding ſtairs turn about: this is properly a cylinder of ſtone which bears on the ground, and is formed by the end of the ſteps of the winding-ſtairs. There are alſo newels of wood, which are pieces of timber placed perpendicularly, receiving the tenants of the ſteps of the wooden ſtairs into their mortices, and on which are fitted the ſhafts and reſts of the ſtair caſe, and the flights of each ſtory.

NEWTONIAN PHILOSOPHY, the doctrine of the univerſe, and particularly of the heavenly bodies; their laws, affections, &c. as delivered by Sir Iſaac Newton.

The term Newtonian philoſophy is applied very differently by different authors. Some, under this philoſophy, include all the corpuſcular philoſophy, conſidered as it now ſtands corrected and reformed by the diſcoveries and improvements made in the ſeveral parts thereof by Sir Iſaac Newton. In this ſenſe it is that s'Graveſande calls his Elements of Phyſics, an Introduction to the Newtonian Philoſophy; and in this ſenſe, the Newtonian is the ſame with the new philoſophy, in oppoſition to the Carteſian, the peripatetic, and the antient corpuſcular philoſophy. See CARTESIAN, &c. Others, by Newtonian philoſophy, mean the method or order which Sir Iſaac obſerves in philoſophizing, viz. the reaſoning and drawing of concluſions directly from phænomena, excluſive of all previous hypotheſes; the beginning from ſimple principles, deducing the firſt powers and laws of nature from a few ſelect phænomena, and then applying thoſe laws, &c. to account for other things: and in this ſenſe, the Newtonian is the ſame with the experimental philoſophy.

Others again, by Newtonian philoſophy, mean that wherein phyſical bodies are conſidered mathematically, and where geometry and mechanics are applied to the ſolution of phænomena; in which ſenſe, the Newtonian is the ſame with the mechanical and mathematical philoſophy.

Others again, by Newtonian philoſophy, underſtand that part of phyſical knowledge which Sir Iſaac Newton has handled, improved, and demonſtrated in his Principia.

And, laſtly, others, by Newtonian philoſophy mean the new principles which Sir Iſaac has brought into philoſophy, the new ſyſtem founded thereon, and the new ſolutions of phænomena thence deduced; or that which characterizes and diſtinguiſhes his philoſophy from all others: and this is the ſenſe in which we ſhall chiefly conſider it.

As to the hiſtory of this philoſophy, we have but little to ſay: it was firſt made public in 1686, by the author, then a fellow of Trinity-college, Cambridge; and in the year 1713, republiſhed with conſiderable improvements. Several other authors have ſince attempted to make it plainer, by ſetting aſide many of the more ſublime mathematical reſearches, and ſubſtituting either more obvious reaſonings or experiments in lieu thereof; particularly Mr. Whiſton, in his Prelect. Phyſ. Mathem. s'Graveſande, in his Elem. and Inſt. and lately, by the learned Comment of Le Seur and Jacquier upon Sir Iſaac's Principia.

The philoſophy itſelf is laid down chiefly in the third book of the Principia; the two preceding books being taken up in preparing the way; and laying down ſuch principles of mathematics as have the moſt relation to philoſophy: ſuch are the laws and conditions of powers; and theſe, to render them leſs dry and geometrical, the author illuſtrates by ſcholia in philoſophy, relating chiefly to the denſity and reſiſtance of bodies, the motion of light and ſounds, a vacuum, &c.

In the third book he proceeds to the philoſophy itſelf; and from the ſame principles deduces the ſtructure of the univerſe, and the powers of gravity, whereby bodies tend towards the ſun and planets; and, from theſe powers, the motions of the planets and comets, the theory of the moon and the tides.

This book, which he calls De Mundi Syſtemate, he tells us, was firſt wrote in the popular way; but conſidering, that ſuch as are unacquainted with the ſaid principles, would not conceive the force of the conſequences, nor be induced to lay aſide their antient prejudices; for this reaſon, and to prevent the thing from being in continual diſpute, he digeſted the ſum of that book into propoſitions, in the mathematical manner, ſo as it might only come to be read by ſuch as had firſt conſidered the principles; not that it is neceſſary a man ſhould maſter them all; many of them, even the firſt rate mathematicians, would find a difficulty in getting over. It is enough to have read the definitions, laws of motion, and the three firſt ſections of the firſt book; after which, the author himſelf directs us to paſs on to the book De Syſtemate Mundi.

The great principle on which the whole philoſophy is founded, is the power of gravity: this principle is not new: Kepler, long ago, hinted it in his Introduct. ad Mot. Martis. He even diſcovered ſome of the properties thereof, and their effects in the motions of the primary planets; but the glory of bringing it to a phyſical demonſtration, was reſerved to the Engliſh philoſopher. See the article GRAVITATION.

His proof of this principle from phænomena, together with the application of the ſame principle to the various other appearances of nature, or the deducing thoſe appearances from that principle, conſtitute the Newtonian ſyſtem: which, drawn in miniature, will ſtand thus:

1. The phænomena are, 1. That the ſatellites of Jupiter do, by radii drawn to the center of the planet, deſcribe areas proportional to their times; and that their periodical times are in a ſeſquiplicate ratio

of their diſtances from its center; in which the obſervations of all aſtronomers agree. 2. the ſame phænomenon holds of the ſatellites of Saturn, with regard to Saturn; and of the moon with regard to the earth. 3. The periodical times of the primary planets about the ſun, are in a ſeſquiplicate ratio of their mean diſtances from the ſun. But, 4. The primary planets do not deſcribe areas any way proportional to their periodical times, about the earth; as being ſometimes ſeen ſtationary, and ſometimes retrograde, with regard thereto.

2. The powers whereby the ſatellites of Jupiter are conſtantly drawn out of their rectilinear courſe, and retained in their orbits, reſpect the center of Jupiter, and are reciprocally as the ſquares of the diſtances from the ſame center. 2. The ſame holds of the ſatellites of Saturn, with regard to Saturn; of the moon, with regard to the earth; and of the primary planets, with regard to the ſun.

3. The moon gravitates towards the earth, and by the power of that gravity is retained in her orbit: and the ſame holds of the other ſatellites, with reſpect to their primary planets; and of the primaries, with reſpect to the ſun.

. As to the moon, the propoſition is thus proved: the moon's mean diſtance is 60 ſemi-diameters of the earth; her period, with regard to the fixed ſtars, is 27 days, 7 hours, 43 minutes; and the earth's circumference 123249600 Paris feet. Now, ſuppoſing the moon to have loſt all her motion, and to be let drop to the earth, with the power which retains her in her orbit, in the ſpace of one minute ſhe will fall 15$\frac{1}{12}$ Paris feet; the arch ſhe deſcribes in her mean motion, at the diſtance of 60 diameters of the earth, being the verſed ſine of 15$\frac{1}{12}$ Paris feet. Hence, as the power, as it approaches the earth, increaſes in a duplicate ratio of the diſtance inverſely; ſo as at the ſurface of the earth it is 60 × 60 greater than at the moon; a body falling with that force in our region muſt, in a minute's time, deſcribe the ſpace of 60 × 60 × 15$\frac{1}{12}$ Paris feet, and 15$\frac{1}{12}$ Paris feet in the ſpace of one ſecond.

But this is the rate at which bodies fall by their gravity at the ſurface of our earth; as Huygens has demonſtrated by experiments with pendulums. Conſequently, the power whereby the moon is retained in her orbit, is the very ſame we call gravity; for, if they were different, a body, falling with both powers together, would deſcend with double the velocity, and in a ſecond of time deſcribe 30$\frac{1}{6}$ feet.

As to the other ſecondary planets, their phænomena, with reſpect to their primary ones, being of the ſame kind with thoſe of the moon about the earth, it is argued by analogy, they depend on the ſame cauſes; it being a rule or axiom all philoſophers agree to, that effects of the ſame kind have the ſame cauſes.

Again, attraction is always mutual, i. e. the reaction is equal to the action: conſequently, the primary planets gravitate towards their ſecondary ones, the earth towards the moon, and the ſun towards them all. And this gravity, with regard to each ſeveral planet, is reciprocally as the ſquare of its diſtance from the center of gravity.

4. All bodies gravitate towards all the planets; and their weight towards any one planet; at equal diſtances from the center of the planet, is proportional to the quantity of matter in each.

For the law of the deſcent of heavy bodies towards the earth, ſetting aſide their unequal retardation from the reſiſtance of the air, is this, that all bodies fall equal ſpaces in equal times; but the nature of gravity or weight, no doubt, is the ſame on the other planets as on the earth.

Suppoſe, e. g. ſuch bodies raiſed to the ſurface of the moon, and together with the moon deprived at once of all progreſſive motion, and dropped towards the earth: it is ſhewn, that in equal times they will deſcribe equal ſpaces with the moon; and therefore, that quantity of matter is to that of the moon, as their weights to its weight.

Add, that ſince Jupiter's ſatellites revolve in times that are in a ſeſquiplicate ratio of their diſtances from the center of Jupiter, and conſequently at equal diſtances from Jupiter, their accelerating gravities are equal; therefore, falling equal altitudes in equal times, they will deſcribe equal ſpaces; juſt as in heavy bodies on our earth. And the ſame argument will hold of the primary planets with regard to the ſun, and the powers whereby unequal bodies are equally accelerated, are as the bodies, i. e. the weights are as the quantities of matter in the planets, and the weight of the primary and ſecondery planets towards the ſun, are as the quantities of matter in the planets and ſatellites. See the article JUPITER.

And hence are ſeveral corollaries drawn relating to the weights of bodies on the ſurface of the earth, magnetiſm, and the exiſtence of a vacuum.

5. Gravity extends itſelf towards all bodies, and is in proportion to the quantity of matter in each.

That all planets gravitate towards each other, has been already ſhewn; likewiſe, that the gravity towards any one, conſidered apart, is reciprocally as the ſquares of its diſtance from the center of the planet; conſequently, gravity is proportionable to the matter therein.

Farther, as all the parts of any planet A, gravitate towards another planet B; and the gravity of any part is to the gravity of the whole, as the matter of the part to the matter of the whole; and re-action equal to action: the planet B will gravitate towards all the parts of the planet A; and its gravity towards any part will be to its gravity towards the whole, as the matter of the part to the matter of the whole.

Hence we derive the methods of finding and comparing weights of bodies towards different planets;

of finding the quantity of matter in the ſeveral planets, and their denſities; ſince the weights of equal bodies, revolving about planets, are as the diameter of their orbits directly, and as the ſquares of the periodical times inverſely; and the weights at any diſtance from the center of the planet, are greater or leſs in a duplicate ratio of their diſtances inverſely. And ſince the quantities of matter in the planets are as their powers at equal diſtances from their centers: and laſtly, ſince the weights of equal and homogeneous bodies towards homogeneous ſpheres are, at the ſurfaces of the ſpheres, as the diameters of thoſe ſpheres; and conſequently, the denſities of heterogeneous bodies, are as the weights at the diameters of the ſpheres.

6. The common center of gravity of the ſun, and all the planets is at reſt; and the ſun, though always in motion, yet never recedes far from the common center of all the planets.

For the matter in the ſun being to that in Jupiter as 1033 to 1; and Jupiter's diſtance from the ſun to the ſemi-diameter of the ſun in a ratio ſomewhat bigger; the common center of gravity of Jupiter and the ſun will be a point a little without the ſun's ſurface; and by the ſame means, the common center of Saturn and the ſun will be a point a little within the ſun's ſurface; and the common center of the earth, and all the planets, will be ſcarce one diameter of the ſun diſtant from the center thereof: but the center is always at reſt; therefore, though the ſun will have a motion this and that way, according to the various ſituations of the planets, yet it can never recede far from the center; ſo that the common center of gravity of the earth, ſun, and planets, may be eſteemed the center of the whole world.

7. The planets move in ellipſes that have their foci in the center of the ſun, and deſcribe areas proportionable to their times. This we have already laid down à poſteriori, as a phænomenon; and now, that the principle of the heavenly motions is ſhewn, we deduce it therefrom à priori. Thus, ſince the weights of the planets towards the ſun are reciprocally, as the ſquares of their diſtances from the center of the ſun; if the ſun were at reſt, and the other planets did not act on each other, their orbits would be elliptical, having the ſun in the common umbilicus, and would deſcribe areas proportionable to the times; but the mutual actions of the planets are very ſmall, and may be well thrown aſide.

Indeed, the action of Jupiter on Saturn is of ſome conſequence; and hence, according to the different ſituation and diſtances of thoſe two planets, their orbits will be a little diſturbed. The earth's orbit too is ſenſibly diſturbed by the action of the moon; and the common center of the two deſcribes an ellipſis round the ſun placed in the umbilicus; and, with a radius drawn to the center of the ſun, deſcribes areas proportionable to the times.

8. The aphelia and nodes of the planets are at reſt, excepting for ſome inconſiderable irregularities ariſing from the action of the revolving planets and comets. Conſequently, as the fixed ſtars retain their poſition to the aphelia and nodes, they too are at reſt.

9. The axis, or polar diameter, of the planets, is leſs than the equatorial diameter.

The planets, had they no diurnal rotation, would be ſpheres, as having an equal gravity on every ſide: but by this rotation, the parts receding from the axis endeavour to riſe towards the equator, which, if the matter they conſiſt of be fluid, will be affected very ſenſibly. Accordingly, Jupiter, whoſe denſity is found not much to exceed that of water on our globe, is obſerved by aſtronomers to be conſiderably leſs between the two poles, than from eaſt to weſt. And, on the ſame principle, unleſs our earth were lighter at the equator than towards the poles, the ſea would riſe under the equator, and overflow all near it. But this figure of the earth Sir Iſaac Newton proves likewiſe à poſteriori, from the oſcillations of pendulums being ſlower and ſmaller in the equinoxial, than in the polar parts of the globe. See the article EARTH.

10. All the moon's motions, and all the inequalities of theſe motions, follow from theſe principles, e. g. her unequal velocity, and that of her nodes and apogee in the ſyzygies and quadratures; the differences in her eccentricity and her variation. See MOON.

11. From the inequalities of the lunar motions, we can deduce the ſeveral inequalities in the motions of the ſatellites.

12. From theſe principles, particularly the action of the ſun and moon upon the earth, it follows, that we muſt have tides, or that the ſea muſt ſwell and ſubſide twice every day.

13. Hence, likewiſe, follows the whole theory of comets, as that they are above the region of the moon, and in the planetary ſpaces; that they ſhine by the ſun's light, reflected from them; that they move in conic ſections, whoſe umbilici are in the center of the ſun; and, by radii drawn to the ſun, deſcribe areas proportional to the times; that the orbits, or trajectories, are very nearly parabolas; that their bodies are ſolid, compact, &c. like thoſe of the planets, and muſt therefore acquire an immenſe heat in their perihelia; that their tails are exhalations, ariſing from and encompaſing them like atmoſpheres.

NICHE, in architecture, a hollow ſunk into a wall, for the commodious and agreeable placing a ſtatue.

The ordinary proportion of a niche is to have two circles in height and one in width; but M. Le Clerc makes their height ſomething more, the exceſs being to compenſate for the height of the pedeſtal of the ſtatue. The hollow is ſemicircular at bottom, that is, in its plan; and at top it terminates in a kind of canopy. Niches have frequently an impoſt, and an archivolt or head-band, and the canopy wrought and enriched in the manner of a ſhell. The breadth of the archivolt may be made equal to a ſixth or ſeventh part of the niche, and the height of the impoſt to a fifth or ſixth part of the ſame: and the impoſt and archivolt ought to conſiſt of ſuch mouldings as have ſome relation to the architecture of the place. Niches are ſometimes made with ruſtic-work, ſometimes with ſhell-work, and ſometimes of cradle or arbour-work. Niches are ſometimes made ſquare, but theſe want all the beauty of the others.

NICOLAITANS, in church hiſtory, Chriſtian heretics who aſſumed this name from Nicolas of Antioch; who, being a gentile by birth, firſt embraced Judaiſm, and then Chriſtianity; when his zeal and devotion recommended him to the church of Jeruſalem, by whom he was choſen one of the firſt deacons.

Many of the primitive writers believe, that Nicolas was rather the occaſion than the author of the infamous practices of thoſe who aſſumed his name, who were expreſsly condemned by the ſpirit of God himſelf, Apoc. ii. 6. And, indeed, their opinions and actions were highly extravagant and criminal. They allowed a community of wives; made no difference between ordinary meats and thoſe offered to idols; and told I know not what fables of the creation and diſpoſition of the world.

According to Euſebius, they ſubſiſted but a ſhort time; but Tertullian ſays, they only changed their name, and that their hereſies paſſed into the ſect of the Cainians. See Cainians.

NICOTIANA, tobacco, in botany. See the article Tobacco.

NICTITATING Membrane, in comparative anatomy, a thin membrane, chiefly found in the bird and fiſh-kind, which covers the eyes of theſe animals, ſheltering them from the duſt or too much light; yet is ſo thin and pellucid, that they can ſee pretty well through it.

NIDUS, among naturaliſts, ſignifies a neſt, or proper repoſitory for the eggs of birds, inſects, &c. wherein the young of theſe animals are hatched and nurſed.

NIECE, a brother or ſiſter's daughter; which in the civil law is reckoned the third degree of conſanguinity.

NIGELLA, fennel-flower, in botany, a genus of plants, whoſe flower conſiſts of five ovate, plain, obtuſe petals, contracted at their baſe, and eight very ſhort nectariums, placed in a circle and bilabiated: the filaments are numerous, ſubulated, and ſhorter than the petals; theſe are topped with upright, obtuſe, compreſſed antheræ: the germina are either five or ten, which become ſo many oblong, compreſſed, acuminated capſules, which are filled with rough angulated ſeeds.

NIGHT, that part of the natural day during which the ſun is underneath the horizon; or that ſpace wherein it is duſky. See Day.

Night was originally divided by the Hebrews, and other eaſtern nations, into three parts, or watchings. The Romans, and afterwards the Jews from them, divided the night into four parts, or watches; the firſt of which began at ſun-ſet, and laſted till nine at night, according to our way of reckoning; the ſecond laſted till midnight; the third till three in the morning; and the fourth ended at ſun-riſe. The ancient Gauls and Germans divided their time not by days but by nights; and the people of Iceland and the Arabs do the ſame at this day. The like is alſo obſerved of our Saxon anceſtors.

Night-Mare, in medicine, a diſeaſe called by phyſicians ephialtes and incubus. See the article Incubus.

Night-Walkers, *Noctambuli.* See the article Noctambuli.

NIGHTINGALE, *Luſcinia*, in ornithology, the browniſh-grey motacilla, with the annules of the knees grey.

This bird is more eminent for the ſweetneſs of its note, than for its beauty: it is of the ſize of the linnet, but in ſhape it more reſembles the red-breaſt; the head is ſmall, the eyes are large, and their iris pale; the beak is duſky, ſlender, and moderately long; the head, neck, and back, are of a greyiſh-brown; the upper parts of the wings, and about the tail, have a tinge of reddiſh mixed with this; and the throat, breaſt, and belly, are of a pale whitiſh grey.

NIGHTSHADE, *Solanum*, in botany. See the article Solanum.

Deadly Nightshade. See Atropa.

NIHILS, or Nichils, iſſues which a ſheriff, who is oppoſed in the exchequer, ſays are nothing worth, and not to be levied, through the inſufficiency of the parties from whom the ſame are due.

NIMBUS, in antiquity, a circle obſerved on certain medals, or round the head of ſome emperors, anſwering to the circles of light, drawn around the images of ſaints.

The nimbus is ſeen on the medals of Maurice, Phocas, and others, even of the upper empire.

NIPPERS, in the manege, are four teeth in the fore-part of a horſe's mouth, two in the upper and two in the lower jaw. A horſe puts them forth between the ſecond and third year. See the article Tooth.

Nippers, is alſo an inſtrument uſed among ſmiths and farriers; being a kind of pincers, wherewith, in ſhoeing a horſe, they cut the nails before they rivet them. It is alſo uſed in taking off a ſhoe.

NIPPERS, in the marine, certain pieces of flat platted cordage, employed in heaving in the cable of a ſhip of war. See the articles MESSENGER and VOYAL.

When the cable is drawn into the ſhip by the force of the capſtern, there is always a rope of a ſmaller ſize, which is more convenient and pliable than the cable, wound about the capſtern; this rope is termed the voyal or meſſenger: it is faſtened in ſeveral places to the cable, by the nippers, as the cable comes in.

Theſe nippers are generally about ſeven, eight, or nine feet in length, in proportion to the ſize of the cable: they are clapped on the cable as ſoon as it enters the fore-part of the ſhip, and are taken off as ſoon as they reach about the middle of the deck, that the cable may be coiled away below, with all convenient diſpatch. There are generally five or ſix nippers on the cable at once; the boys of the ſhip walking along the deck with the ends of them in their hands, till they come to the place where it is neceſſary to take them off.

NIPPLES, *Papillæ*, in anatomy. See the article BREASTS.

NIPPLE-WORT, *Lapſana*, in botany. See the article LAPSANA.

NISI PRIUS, in law, a judicial writ which lies in caſes where the jury being impannelled and returned before the juſtices of the bank, one of the parties requeſts to have ſuch a writ, for the eaſe of the country, in order that the trial may come before the juſtices in the ſame county on their coming thither. Theſe trials by niſi prius are intended for the eaſe of the country, by ſaving the parties, jurors, and witneſſes, the trouble of coming to Weſtminſter. The purport of a writ of niſi prius is, that the ſheriff is thereby commanded to bring to Weſtminſter the men impannelled, at a certain day before the juſtices, "Niſi prius juſticiarii domini regis ad "aſſiſas capiendas venerint;" that is, unleſs the juſtices go before the day into ſuch a county to take aſſizes.

NISSOLA, in botany, a genus of plants, whoſe flower is papilionaceous, the vexillum is roundiſh and reflexed, the alæ are oblong, obtuſe, and erect, which ſhut up the carina. The fruit is an oblong, cylindric capſule, containing often but one oblong ſeed.

NITRARIA, in botany, a genus of plants, whoſe flower conſiſts of five oblong patent petals, with fifteen ſubulated filaments, topped with roundiſh antheræ. The fruit is an ovato-oblong acuminated drupe, with one cell, containing one trilocular oval ſeed.

NITRE, or ſalt-petre, is a ſimple ſalt, which is pellucid, but ſometimes whitiſh, and in its moſt perfect pieces is in the form of long and ſlender cryſtals, of a priſmatic figure, of an equal thickneſs throughout their whole length, compoſed of ſix planes or ſides, and terminated at the end by a pyramid, which is ſmall and ſhort in proportion to the ſize of the column, but compoſed of the ſame number of planes. Theſe ſprigs vaſtly reſemble the common ſprig cryſtals of the rocks. Nitre is to be choſen in fair, long, and tranſparent cryſtals, and ſuch as when applied to the tongue, affects it with a peculiar kind of coldneſs; ſuch as when ſet on the fire eaſily melts, and on being thrown upon it, blazes very furiouſly, and emits a bright and vivid flame without crackling, and leaves only a very little fixed ſalt on the coals.

Nitre is found immerſed in imperceptible particles in earthy ſubſtances, as the particles of metals in their ores; but ſometimes it is found native and pure, in the form of an efflorеſcence or ſhapeleſs ſalt, either on its ore or on old walls. The earth from which nitre is made, both in Perſia and the Eaſt-Indies, is a kind of marl, found on the bare cliffs on the ſides of hills expoſed to the northern or eaſtern winds, and never in any other ſituation. The people of thoſe countries collect large quantities of this, and having a large and deep pit, which they line with a hard and tenacious kind of clay, they fill it half full of water, and into this they throw the earth; when this is broken and mouldered to powder, they add more water, and ſtirring all well together, they let it ſtand four or five days; after this they open a hole made in one of the ſides of the pit, which lets out all the clear water into a channel of about a foot wide, which is in the ſame manner clayed within, through which it runs into another very wide and ſhallow pit, which is prepared in a level ground, and is ſecured by ſlight walls on all but the north-eaſt ſide, and is open to the ſun at the top; here the water by degrees evaporates, and the ſalt which it had imbibed from the earth, cryſtallizes into ſmall, browniſh-white hexaedral, but uſually imperfect cryſtals, which are preſerved; and this is the rough ſaltpetre we receive from the Eaſt-Indies. The far greater part of the nitre uſed in the world is prepared in this manner; though there are many other methods of procuring it. In ſeveral of the eaſtern nations, the ruins of old buildings expoſed to the north and eaſt winds, and ſheltered from rain, have their walls covered with an efflorеſcence of a nitrous ſalt, which they throw into the ſolution of the ſalt from the ore, when it will no longer afford any cryſtals of itſelf, and by this addition it becomes capable of affording a large quantity of additional cryſtals like the firſt. Earths moiſtened or manured with the excrements of animals, as the earths of pigeon-houſes, and the like, all afford more or leſs nitre; and vaſt quantities of this ſalt are annually made in France, by boiling in water the matter of old walls, the old plaiſter of ruined buildings, and the earths of ſtables and other places where animals have been fed.

Saltpetre is of very great uſe in the manufactures;

beſides being the baſis of gun-powder, it is uſed in the making of white glaſs, and is of the ſame uſe as common ſalt in preſerving of foods.

Purified nitre is one of the capital remedies in medicine. It cools and thins the blood, and gives it a fine florid colour; and therefore in all inflammatory diſeaſes attended with condenſations of the blood, this ſalt proves excellently cooling and attenuating. It is greatly ſerviceable in pleuriſies, peripneumonies and quinſies, in the ſuppreſſion of urine, and in the ſmall-pox.

NOBILITY, a quality that ennobles, and raiſes a perſon poſſeſſed of it above the rank of a commoner.

The origin of nobility in Europe is by ſome referred to the Goths; who, after they had ſeized a part of Europe, rewarded their captains with titles of honour, to diſtinguiſh them from the common people. In Britain the term nobility is reſtrained to degrees of dignity above knighthood; but every where elſe nobility and gentility are the ſame.

NOBLE, a money of account containing ſix ſhillings and eight-pence.

The noble was anciently a real coin, ſtruck in the reign of Edward III. and then called the penny of gold; but it was afterwards called a roſe-noble, from its being ſtamped with a roſe.

NOCTILUCA, in phyſiology, a ſpecies of phoſphorus, ſo called becauſe it ſhines in the night without any light being thrown upon it; ſuch is the phoſphorus made of urine. See the article Phosphorus.

NOCTURNAL, ſomething relating to the night, in contradiſtinction to diurnal.

Nocturnal-Arch, in aſtronomy, the arch of a circle deſcribed by the ſun, or a ſtar, in the night.

Semi-Nocturnal *arch of the Sun*, is that portion of a circle he paſſes over between the lower part of our meridian and the point of the horizon, wherein he ariſes; or between the point of the horizon wherein he ſets, and the lower part of our meridian.

Nocturnal, *Nocturlabium*, an inſtrument formerly much uſed at ſea, to take the altitude or depreſſion of ſome ſtars about the pole, in order to find the latitude and hour of the night.

NODATED Hyperbola, a name given by Sir Iſaac Newton, to a kind of hyperbola, which, by turning round, decuſſates or croſſes itſelf.

NODE, *Nodus*, in ſurgery, a tumour ariſing on the bones, and uſually proceeding from ſome venereal cauſe; being much the ſame with what is otherwiſe called exoſtoſis.

Nodes, in aſtronomy, the two points wherein the orbit of a plane interſects the ecliptic.

NODULE, or Nodulus, a word uſed in pharmacy, for a knot tied in a rag, and including ſome medicinal ingredients to be ſuſpended in any liquor, as beer, or wine, to give it a tincture, or the like.

It ſignifies alſo a parcel of odoriferous ſimples, tied up in a piece of ſilk, for the patient to be frequently ſmelling to.

NODUS, or Node, in dialling, a certain point or pole in the gnomon of a dial, by the ſhadow or light whereof, either the hour of the day in dials without furniture, or the parallels of the ſun's declination, and his place in the ecliptic, &c. in dials with furniture, are ſhewn.

Nodus is alſo uſed for the hole in a ceiling of a room, or in the window, for making of a dial on the floor, wall, or the like.

NOERA, a word uſed by chemiſts, for the head of an alembec, or the cover of a cucurbite, or any other veſſel uſed in diſtillation.

NOETIANS, in church-hiſtory, Chriſtian heretics in the IIId century, followers of Noetius, a philoſopher of Epheſus, who pretended that he was another Moſes, ſent by God; and that his brother was a new Aaron. His hereſy conſiſted in affirming that there was but one perſon in the Godhead; and that the Word and the Holy Spirit were but external denominations, given to God, in conſequence of different operations; that as creator, he is called Father; as incarnate, Son; and as deſcending on the apoſtles, Holy Ghoſt.

NOLANA, in botany, a genus of plants, whoſe flower is monopetalous, campanulated, plicated, and ſpreading open: it hath five ſubulated filaments, topped with arrow-ſhaped antheræ. The ſeeds are five in number, of a rouniſh figure, and placed on a receptacle.

NOLI me tangere, *touch me not*, in medicine, a malignant eruption in the face, occaſioned by an extremely ſharp corroſive humour; thus called, either becauſe it affects thoſe who touch it, or becauſe the more it is touched, the worſe it grows, and the farther it ſpreads.

NOMBRIL Point, in heraldry, is the next below the feſs-point, or the very center of the eſcutcheon. See Point.

Suppoſing the eſcutcheon divided into two equal parts below the feſs, the firſt of theſe diviſions is the nombril, and the lower the baſe.

NOME, or Name, in algebra, denotes any quantity with a ſign prefixed or added to it, whereby it is connected with ſome other quantity, upon which the whole becomes a binominal, trinominal, or the like.

NOMINALS, or Nominalists, a ſect of ſchool-philoſophers, the diſciples and followers of Occam, or Ocham, an Engliſh cordelier, in the fourteenth century. They were great dealers in words, whence they were denominated word-ſellers; but had the denomination of nominaliſts, becauſe that, in oppoſition to the realiſts, they maintained, that words, and not things, were the object of dialectics.

NOMINATIVE, in grammar, the firſt caſe of nouns, which are declinable. See the articles Case and Noun.

NONAGESIMAL, in aſtronomy, the 90th degree of the ecliptic, reckoned from the eaſtern term or point. See the article Ecliptic, &c.

NON-ABILITY, in law, incapacity, or an exception taken againſt a plaintiff, in a cauſe, on ſome juſt ground, why he cannot commence a ſuit in law; as his being attainted of felony, outlawry, &c.

Non-Age, in law, generally ſignifies all the time a perſon continues under the age of one and twenty; but in a ſpecial ſenſe it is all the time a perſon is under the age of fourteen.

Non compos mentis, in law, is uſed to denote a perſon's not being of ſound memory and underſtanding. Of theſe perſons there are four different kinds, an idiot, a madman, a lunatic who has lucid intervals, and a drunkard who deprives himſelf of reaſon by his own act and deed. In all theſe caſes, except the laſt, one that is non compos mentis ſhall not loſe his life for felony or murder; but the drunkard can have no indulgence on account of the loſs of his reaſon, for, in the eye of the law, his drunkenneſs does not extenuate, but aggravate his offence.

Non-Naturals, in medicine, ſo called, becauſe by their abuſe they become the cauſe of diſeaſe. See Disease.

Phyſicians have divided the non-naturals into ſix claſſes, viz. the air, meats and drinks, ſleep and watching, motion and reſt, the paſſions of the mind, the retentions and excretions.

Non-Residence is particularly applied to ſpiritual perſons, who wilfully abſent themſelves for the ſpace of one month, or two months at different times of the year, from their benefices; for which they are liable to penalties, by the ſtatute of non-reſidence: but biſhops, the king's chaplains, &c. are excepted.

Non-Suit, ſignifies the dropping of a ſuit or action, or a renouncing thereof by the plaintiff or defendant, which happens moſt commonly upon the diſcovery of ſome error in the plaintiff's proceedings, when the cauſe is ſo far proceeded in, that the jury is ready at the bar to deliver in their virdict.

A non-ſuit, it is ſaid, may be in the following caſes, viz. where a perſon brings a perſonal action, and does not proſecute it with effect; or if, upon the trial, he refuſes to ſtand a verdict, then he becomes non-ſuited; ſo where the plaintiff is not ready for trial at the calling and ſwearing of the jury, it is preſumed he does not ſtand to proceed in his cauſe, and on that account the court may call him non-ſuited. Likewiſe, on a trial, when the jury comes in to deliver their verdict, and when the plaintiff is called on, to hear the ſame, in that caſe, if he does not appear after being thrice called by the crier of the court, he is non-ſuited; which non-ſuit is to be recorded by the ſecondary, by the direction of the court: but if he afterwards appears, before the non-ſuit is actually recorded, the court may take the verdict; for that is not a non-ſuit, till it be recorded, upon motion made by the counſel for this purpoſe; and then it is a part of the record, in the nature of a judgment againſt the plaintiff.

NONCONFORMISTS, the ſame with diſſenters. See the article Dissenters.

NONE, one of the ſeven canonical hours in the Romiſh church, anſwering to three o'clock in the afternoon.

Nones, *Nonæ*, in the Roman calendar, the fifth day of the months January, February, April, June, Auguſt, September, November, and December; and the ſeventh of March, May, July, and October.

March, May, July, and October, had ſix days in their nones; becauſe theſe alone, in the ancient conſtitution of the year by Numa, had thirty-one days apiece, the reſt having only twenty-nine, and February thirty: but when Cæſar reformed the year, and made other months contain thirty-one days, he did not allot them ſix days of nones.

NORMAL, in geometry, ſignifies the ſame with a perpendicular, and is uſed for a line or plane that interſects another perpendicularly.

NORROY, the title of the third of the three kings at arms. See Herald.

NORTH, in coſmography, one of the four cardinal points. See Compass.

NORTHING, in navigation, the latitude made by a ſhip, in ſailing towards the north-pole.

NOSE, *Naſus*, in anatomy, the primary organ of ſmelling.

This varies greatly in ſize and figure in different ſubjects: anatomiſts divide its parts into external and internal; thoſe moſt obvious are the dorſum or ridge, which runs along its whole length, one part of which is more prominent than the reſt, and called the ſpine; the orbiculus, or extreme part, which in many is turned round; the alæ or pinnæ, which are the ſides; and the ſeptum, which divides the noſe into two parts, called nares or noſtrils; the hairs alſo are of this number; theſe ſerve to hinder the mucous of the noſtrils from continually running out, and to prevent inſects and extraneous ſubſtances of many kinds from getting in. To theſe may be added, the common teguments, viz. the epidermis, the fat, and the cutis. The upper part of the noſe is rigid, and compoſed of bones; the lower part is compoſed of a number of cartilages, muſcles, and membranes.

The internal parts of the noſe are the bones; as the oſſa naſi, the maxillaria, the os cribriforme, the oſſa ſpongioſa, the os frontale, the lachrymalia, the os palati, the vomer, and the os ſphenoides. The cartilages, which form the lower part, are connected by membranes, in order to render it flexible; the firſt of theſe form the anterior part of the ſeptum narium; there are two very large and conſpicuous ones in each of the alæ, and between theſe there are placed ſometimes two, ſometimes three, and ſometimes more ſmaller ones; the ſeptum narium is cartilaginous in its anterior and lower part; in its poſterior and upper, it is bony: and theſe parts are ſurrounded by robuſt and ſtrong membranes, which join them firmly together.

NOSTRILS, *Nares*, in anatomy, the two apertures or cavities of the noſe, through which the air paſſes, and which ſerve to convey odours, and to carry off the pituita ſeparated in the ſinuſes of the baſe of the cranium. See NOSE.

NOTARY, *Notarius*, ſignifies a perſon, uſually ſome ſcrivener, who takes notes, or frames ſhort draughts, of contracts, obligations, charter-parties, or other writings. At preſent we call him a notary-public, who publicly atteſts deeds, or writings, in order to make them authentic in another nation: but he is principally employed in buſineſs concerning merchants, as making proteſts of bills of exchange, &c. And noting a bill, is where he goes to take notice of a merchant's refuſal to accept or pay the ſame.

NOTATION, in arithmetic and algebra, the method of expreſſing numbers or quantities by ſigns or characters, appropriated for that purpoſe.

NOTE, *nota*, is uſed for a character or abbreviature, ſerving to denote or expreſs ſomething in a little compaſs.

NOTES, in muſic, characters which mark the ſounds, i. e. the elevations and fallings of the voice, and the ſwiftneſs and ſlowneſs of its motions. See CHARACTER.

NOTE is likewiſe uſed for a mark made in a book or writing where there occurs ſomething remarkable and worthy of particular notice: as alſo for an obſervation or explication of ſome paſſage in an author added in the margin, at the bottom of the page, or elſewhere, by an editor, in which ſenſe it ſtands contradiſtinguiſhed to text.

NOTE is alſo a minute, or ſhort writing, concerning ſome article of buſineſs, in which ſenſe we ſay, promiſſary note, note of hand, bank note, &c.

To NOTE *a Bill.* See the article BILL.

NOTE *of a Fine*, in law, an abſtract of the fine or contract made by the chirographer, before the ſame is engroſſed.

NOTICE, in law, is defined to be the making of ſomething known, which a man might be ignorant of before: and it has divers effects in our law; for thereby a party giving the ſame, may reap a benefit which he otherwiſe ſhould not have had; and by this means the perſon to whom it is given, is liable to ſome charge or action to which without it he had not been ſubject.

NOTION, in logic, an idea or repreſentation of any thing in the mind. See the article IDEA.

NOVATIONS, a Chriſtian ſect which ſprang up in the third century, ſo called from Novatian, a prieſt of Rome, or Novatus, an African biſhop, who ſeparated from the communion of pope Cornelius, whom Novatian charged with a criminal lenity towards thoſe who had apoſtatized during the perſecution of Decius. He denied the church's power of remitting mortal ſins, upon the offender's repentance; and at laſt went ſo far as to deny that the apoſtles could ever hope for pardon even from God himſelf. Novatus coming to Rome, joined with the followers of Novation, and added to theſe doctrines another, which was the unlawfulneſs of ſecond marriages, againſt which this became as ſevere as againſt apoſtates; denying communion to ſuch as married a ſecond time after baptiſm, and treating widows who married again, as adultereſſes. The two leaders were proſcribed and declared heretics, not for excluding penitents from communion, but for denying that the church had the power of remitting ſins.

NOVEL, in the civil law, a term uſed for the conſtitutions of ſeveral emperors, as of Juſtin, Tiberius, Leo, and more particularly of thoſe of Juſtinian.

NOVEL, in matters of literature, a fictitious hiſtory of a ſeries of ſurprizing and entertaining events in common life, wherein the rules of probability are, or ought to be, ſtrictly preſerved; in which it differs from a romance, where the hero and heroine is ſome prince and princeſs, and the events which lead to the cataſtrophe, are in general highly abſurd and unnatural. The beſt novels are thoſe which by means of a well told ſtory, convey a number of noble and elevated ſentiments, and inſtruct the reader in the knowledge of mankind.

NOVEMBER, in chronology, the eleventh month of the Julian year, conſiſting only of thirty days: it got the name of November, as being the ninth month of Romulus's year, which began with March.

NOVEMSILES, or NOVENSILES DII, in Roman antiquity, certain gods brought to Rome by the Sabines, and ſo called as being nine in number, viz. Lara, Veſta, Minerva, Feronia, Concord, Fidelity, Fortune, Chance, Health.

Some underſtand, by novenſiles dii, new created gods, or thoſe whoſe worſhip was brought from ſome foreign country to Rome; whilſt others pretend, they ſignified the nine muſes.

NOUN, *Nomen*, in grammar, a part of ſpeech, which ſignifies things without any relation to time; as a man, a houſe, ſweet, bitter, &c.

NOURISHMENT, or NUTRITION, in phyſiology. See NUTRITION.

NOWED, in heraldry, ſignifies knotted, from the Latin *nodatus*; being applied to the tails of ſuch creatures as are very long, and ſometime repreſented in coat armour, as if tied up in a knot.

NUCLEUS, in general, denotes the kernel of a nut, or even any ſeed incloſed within a huſk.

The term nucleus is alſo uſed for the body of a comet, otherwiſe called its head. See the article COMET.

NUDITES, in painting and ſculpture, denotes thoſe parts of an human figure which are not covered with any drapery; or thoſe parts where the carnation appears.

NUMBER, *Numerus*, in arithmetic, an aſſemblage of ſeveral units, or things of the ſame kind.

NUMBERS, in poetry, oratory, muſic, &c. are certain meaſures, proportions, or cadences, which render a verſe, period, or ſong, agreeable to the ear. See METRE.

Book of NUMBERS, the fourth book of the Pentateuch, taking its denomination from it numbering the families of Iſreal.

A great part of this book is hiſtorical, relating to ſeveral remarkable paſſages in the Iſraelites march through the wilderneſs. It contains a diſtinct relation of their ſeveral movements from one place to another, or the two and forty ſtages through the wilderneſs, and many other things, whereby we are inſtructed and confirmed in ſome of the weightieſt truths that have immediate reference to God and his providence in the world. But the greateſt part of this book is ſpent in enumerating theſe laws and ordinances, whether civil or ceremonial, which were given by God, but not mentioned before in the preceding books.

NUMB-FISH, the ſame with the torpedo or cramp-fiſh. See the article TORPEDO.

MUMERAL LETTERS, thoſe letters of the alphabet which are generally uſed for figures, as I, V, X, L, C, D, M. See the article NUMERATION.

NUMERAL CHARACTERS. See the article CHARACTER.

NUMERALS, in grammar, thoſe words which expreſs numbers; as 6, 8, 10, &c.

NUMERATION, or NOTATION, in arithmetic, the art of expreſſing in characters any number propoſed in words; or of expreſſing in words any number propoſed in characters.

The characters uſed to expreſs numbers by, are either the ten numeral figures of the Arabians, viz.

one,	two,	three,	four,	five,	ſix,	ſeven,	eight,	nine,	cypher;
1	2	3	4	5	6	7	8	9	0

Or the ſeven numeral letters of the Romans,

one,	five,	ten,	fifty,	hundred,	five-hundred,	thouſand.
I	V	X	L	C	D	M

Each of which figures, beſides their own ſingle value, receives ſeveral denominations according to their place and order. A number has ſo many places as there are figures in it, as 36487 is the number of five places. The order in whoſe number is from the right to the left. The value of places decreaſe in a decuple proportion: for every place to the left is ten times the value of the next place to the right. Each place alſo has its name; and thoſe names, for the more eaſy reading of large numbers, are diſtinguiſhed by periods, half-periods, &c.

$$\left.\begin{array}{l}\text{For as a place}\\ \text{So a half-period}\\ \text{And a period}\end{array}\right\}\text{ is }\left\{\begin{array}{l}\text{ten}\\ \text{a thouſand}\\ \text{a million}\end{array}\right\}\begin{array}{l}\text{times the value}\\ \text{of that before it.}\end{array}$$

A cypher is of itſelf inſignificant; but by its place alters the value of the ſubſequent figure: and, ſince the value of each place is ten times the value of the next before it, it is certain

$$\text{that}\left\{\begin{array}{c}1\\ 2\\ 3\\ \text{\&c.}\end{array}\right\}\begin{array}{l}\text{in the firſt}\\ \text{place, is}\end{array}\left\{\begin{array}{c}10\\ 20\\ 30\\ \text{\&c.}\end{array}\right\}\begin{array}{l}\text{in the}\\ \text{ſecond,}\end{array}\left\{\begin{array}{c}100\\ 200\\ 300\\ \text{\&c.}\end{array}\right\}\begin{array}{l}\text{in the}\\ \text{third,}\end{array}\left\{\begin{array}{c}1000\\ 2000\\ 3000\\ \text{\&c.}\end{array}\right\}\begin{array}{l}\text{in the}\\ \text{fourth,}\\ \text{\&c.}\end{array}$$

The value of each figure in any rank of numbers, how large ſoever, is readily found by the following rule:

Begin at units, ſet a point under the ſeventh place; then reckoning that as one, count forwards, and ſet another under the next ſeventh place, ſo continue to the end.

Then the	firſt	point from units ſtands under	millions,
	ſecond		billions,
	third		trillions,
	fourth, &c.		quadrillions, &c.

As is evident in the following example:

Periods	Quadril.						Trillions						Billions						Millions						Units					
Half-periods	th.			units			th.			units			th.			units			th.			units			th.			units		
Degrees	c	x	u	c	x	u	c	x	u	c	x	u	c	x	u	c	x	u	c	x	u	c	x	u	c	x	u	c	x	u
Figures	1	2	3	4	5	6	7	8	9	0	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	1

By this means you may have as clear a notion of, and may as eaſily read a number of ſeventy places as of ſeven.

NUMERATOR *of a Fraction*. See the article FRACTION.

NUN, a woman, in ſeveral Chriſtian countries, who devotes herſelf, in a cloiſter or nunnery, to a religious life.

NUNCIO, or NUNTIO, an embaſſador from the pope to ſome catholic prince or ſtate, or a perſon who attends on the pope's behalf at a congreſs, or an aſſembly of ſeveral embaſſadors.

NUNCUPATIVE, in the ſchools, ſomething that is only nominal, or has no exiſtence but in name.

NUNCUPATIVE WILL, denotes a laſt will or teſtament, only made verbally, and not put in writing. See the articles WILL and TESTAMENT.

NUPTIAL RITES, the ceremonies attending the ſolemnization of marriage. See the article MARRIAGE.

NURSERY, in gardening, is a piece of land ſet apart for raiſing and propagating all ſorts of trees and plants, to ſupply the garden and other plantations.

In a nurſery for fruit-trees, the following rules are to be obſerved: 1. That the ſoil ſhould not be better than that in which the trees are to be planted out for good. 2. That it ought to be freſh, and not ſuch as has been already worn out by trees, or other large-growing plants. 3. It ought neither to be too wet nor too dry, but rather of a middling nature; though, of the two extremes, dry is to be preferred; becauſe, though trees in ſuch a ſoil do not make ſo great a progreſs yet they are generally ſounder, and more diſpoſed to fruitfulneſs. 4. It muſt be incloſed in ſuch a manner, that neither cattle nor vermin may come in; and ſo as particularly to exclude hares and rabbits, which, when the ground is covered with ſnow, are great deſtroyers of young trees. 5. The ground being incloſed ſhould be carefully trenched about two feet deep; this ſhould be done in Auguſt, that it may be ready for receiving young ſtocks at the ſeaſon for planting, which is commonly about the beginning of October: in trenching the ground, you muſt be careful to cleanſe it from the roots of all noxious weeds. 6. The ſeaſon being come for planting, level down the trenches as equal as poſſible; and then lay out the ground into quarters, which may be laid out in beds for a ſeminary, in which you may ſow the ſeeds or ſtones of fruit. 7. And having provided yourſelf with ſtocks, the next year proceed to tranſplant them, in the following manner: draw a line acroſs the ground intended to be planted, and open a number of trenches exactly ſtraight; then take the ſtocks out of the ſeed-beds; in doing which, you ſhould raiſe the ground with a ſpade, in order to preſerve the roots as entire as poſſible; prune off the very ſmall fibres, and if there are any that have a tendency to root directly downwards, ſuch roots ſhould be ſhortened: then plant them in the trenches, if they are deſigned for ſtandards, in rows three feet and a half, or four feet, from each other, and a foot and a half diſtant in the rows; but if for dwarfs, three feet, row from row, and one foot in the row, will be a ſufficient diſtance. Theſe plants ſhould by no means be headed, or pruned at top, which will weaken them, and cauſe them to produce lateral branches.

If the winter ſhould prove very cold, lay ſome mulch on the ſurface of the ground near their roots, taking care not to let it lie too thick near the ſtems of the plants, and to remove it as ſoon as the froſt is over. In the ſummer ſeaſon, deſtroy the weeds, and dig up the ground every ſpring between the rows.

The ſecond year after planting, ſuch of the ſtocks as are deſigned for dwarfs will be fit to bud; but thoſe that are deſigned for ſtandards ſhould be ſuffered to grow five or ſix feet high before they are budded or grafted; for the manner of doing which, ſee the articles INOCULATION and GRAFTING.

As to timber-trees, Mr. Miller adviſes thoſe gentlemen who would have plantations in parks, woods, &c. to make nurſeries upon the ground intended for planting, where a ſufficient number of the trees may be left ſtanding, after the others have been drawn out to plant in other places.

The ground intended for the flower nurſery ſhould be well ſituated to the ſun; and defended from ſtrong winds by plantations of trees or buildings. The ſoil alſo ſhould be light and dry, eſpecially for bulbous-rooted flowers; for in this nurſery, the off-ſets of all bulbous-rooted flowers ſhould be planted, and remain there till they become blowing roots, when they ſhould be removed into the pleaſure-garden, and planted either in beds or borders, according to the goodneſs of the flowers. Theſe flowers may alſo be raiſed in the nurſery from ſeeds.

The ſeedling auriculas, polyanthoſes, ranunculuſes, anemonies, carnations, &c. ſhould be raiſed in this nurſery, where they ſhould be preſerved till they have flowered, when all thoſe ſhould be marked that are worthy of being tranſplanted into the flower-garden; this ſhould be done in their proper ſeaſons: for all theſe ſeedling flowers ought not indiſcriminately to be expoſed to public view in the pleaſure-garden, becauſe it always happens, that there are great numbers of ordinary flowers produced among them, which will there make but an indifferent appearance.

NUSANCE, in law, a thing done to the annoyance of another.

NUT, *Nux*, among botaniſts, denotes a pericarpium of an extraordinary hardneſs, incloſing a kernel or ſeed; of which there are ſeveral kinds, as filberts, walnuts, &c. See the articles FILBERT, WALNUT, &c.

The word nut makes part of the Engliſh names of ſeveral plants; as the bladder-nut, or ſtaphylæa; the chocolate-nut, or theobroma; the cob-nut, or corylus; the earth-nut, or bunium; the phyſic-nut, or croton, &c. See the articles STAPHYLÆA, &c.

NUTATION, in aſtronomy, a kind of tremulous motion of the axis of the earth, whereby, in each annual revolution, it is twice inclined to the ecliptic, and as often returns to its former poſition. See the articles EARTH and INCLINATION.

Sir Iſaac Newton obſerves, that the moon has the like motion, only very ſmall, and ſcarce ſenſible.

NUTMEG, the kernel of a large fruit of a tree, which grows naturally in the Eaſt-Indian iſlands: it is called by botaniſts Myriſtica; but the deſcription of the flower, and the claſs it belongs to, is not yet properly aſcertained, the plants which produce this fruit being entirely in the poſſeſſion of the Dutch, which they carefully keep to themſelves.

The nutmeg is ſeparated from its inveſtient coat, the mace, before it is ſent over to us; except that the whole fruit is ſometimes imported in preſerve, by way of ſweetmeat, or as a curioſity. See the article MACE.

There are two kinds of nutmeg in the ſhops, the one called by authors the male, and the other the female. The female is the kind in common uſe, and is of the ſhape of an olive: the male is long and cylindric, and has leſs of the fine aromatic flavour than the other, ſo that it is much leſs eſteemed, and people who trade largely in nutmegs will ſeldom buy it. Beſides this oblong kind of nutmegs, there are others of irregular figures, but mere luſus naturæ, not owing to a different ſpecies of the tree. The longer male nutmeg, as we term it, is called by the Dutch the wild nutmeg. It is always diſtinguiſhable from the others, as well by its want of fragrancy, as by its ſhape: it is very ſubject to be worm-eaten, and is ſtrictly forbid by the Dutch to be packed up among the other, becauſe it will give occaſion to their being worm-eaten too, by the inſects getting from it into them, and breeding in all parts of the parcel.

The largeſt, heavieſt, and moſt unctuous of the nutmegs are to be choſen, ſuch as are of the ſhape of an olive, and of the moſt fragrant ſmell. The Dutch import them from the Eaſt-Indies.

Nutmeg is greatly uſed in our foods, and is of excellent virtues as a medicine; it is a good ſtomachic, it promotes digeſtion, and ſtrengthens the ſtomach. It alſo ſtops vomiting; is an excellent remedy in flatuſes; and is happily joined with rhubarb, and other medicines, in diarrhœas. It is obſerved to have a ſoporific virtue, and to exert it too ſtrongly, if taken in immoderate quantities. It has a conſiderable degree of aſtringency; and given after toaſting before the fire, till thoroughly dry and crumbly, it has been ſometimes known alone to cure diarrhœas.

NUTRITION, in the animal œconomy, is the repairing the continual loſs, which the different parts of the body undergo.

The motion of the parts of the body, the friction of theſe parts with each other, and eſpecially the action of the air, would deſtroy the body entirely, if the loſs was not repaired by a proper diet, containing nutritive juices; which being digeſted in the ſtomach, and afterwards converted into chyle, mix with the blood, and are diſtributed through the whole body for its nutrition.

NUX MOSCHATA. See NUTMEG.

NUX PISTACHIA. See PISTACHIA.

NYCHTHEMERON, νυχθημερον, the natural day, or day and night, which together, always make twenty-four hours. See the articles DAY and NIGHT.

NYCTALOPIA, in medicine, a two-fold diſorder of the eye, one of which is oppoſite to the other. In the firſt, the ſight is beſt in the night, and in obſcure places; whereas, in a clear light, their ſight fails, ſo that they can hardly ſee any thing. In the other ſort of nyctalopia, the patient can ſee nothing at all except in a clear and bright light.

As theſe infirmities ariſe from a natural bad formation of the eye, they are therefore incurable.

NYCTANTHES, Arabian-jaſmine, in botany, a genus of plants, whoſe flower is monopetalous and ſaucer-ſhaped, divided at the top into eight oblong ſegments: the ſtamina are two ſubulated filaments, topped with erect antheræ: the fruit is a roundiſh berry, having two cells, each containing a large roundiſh ſeed.

NYCTICORAX, a bird of the heron-kind, called in Engliſh the night-raven, by reaſon it flies chiefly in the night-time, and makes a very diſagreeable croaking.

NYMPH, in mythology, an appellation given to certain inferior goddeſſes inhabiting the mountains, woods, waters, &c. ſaid to be the daughters of Oceanus and Tethys.

Nymph, among naturaliſts, that ſtate of winged inſects, between their living in the form of a worm, and their appearing in the winged or moſt perfect ſtate.

The eggs of inſects are firſt hatched into a kind of worms, or maggots; which afterwards paſs into the nymph-ſtate, ſurrounded with ſhells or caſes of their own ſkins; ſo that, in reality, theſe nymphs are only the embryo-inſects, wrapped up in this covering; from which they at laſt get looſe, though not without great difficulty.

During the nymph-ſtate, the creature loſes its motion. Swammerdam calls it nympha aurelia, or ſimply aurelia; and others give it the name of chryſalis, a term of the like import. See the article Chrysalis.

NYMPHÆ, in anatomy, two membranaceous parts, ſituated on each ſide the rima. They are of a red colour and cavernous ſtructure, ſomewhat reſembling the wattles under a cock's throat. They are ſometimes ſmaller, ſometimes larger, and are continuous to the præputium of the clitoris, and joined to the interior ſide of the labia.

NYMPHÆA, the water-lily, in botany, a genus of plants, the flower of which conſiſts of a number of petals, uſually fifteen; they are ſmaller than the cup, and are inſerted into the ſide of the germen in more than a ſingle ſeries: the fruit is an oval fleſhy berry, containing a great many roundiſh ſeeds.

The root of this plant was recommended by the ancients as an aſtringent for internal uſe, and as a ſtyptic to ſtop the bleeding of wounds, or other hæmorrhages.

NYMPHEUM, in antiquity, a public hall, magnificently decorated, for entertainment, &c. and where thoſe, who wanted convenience at home, held their marriage feaſts; whence the name.

NYMPHOMANIA, in medicine the ſame with furor uterinus. See Furor.

NYMPHOTOMIA, in ſurgery, the operation of cutting the nymphæ, when too large. See the article Nymphæ.

NYSSA, in botany, a genus of plants, producing male and hermaphrodite flowers; they are both deſtitute of a corolla; but the cup is divided into five ſegments, and ſpreads open: the fruit is an ovate unilocular drupe, containing an oval acute nut.

O.

O The fourteenth letter, and fourth vowel of our alphabet, pronounced as in the words *noſe*, *roſe*, &c.

The ſound of this letter is often ſo ſoft, as to require it double, and that chiefly in the middle of words; as *gooſe*, *proof*, &c. and in ſome words this *oo* is pronounced like *u* ſhort, as in *flood*, *blood*, &c.

As a numeral, O is ſometimes uſed for eleven; and with a daſh over it, thus Ō, for eleven thouſand.

OAK-Tree, *Quercus*, in botany, a genus of plants, producing male and female flowers; the male are diſpoſed in a looſe amentum, each having a monophyllous cup, divided into four or five ſegments; there is no corolla, but ſeveral very ſhort filaments topped with large twin antheræ: the cup of the female flower is formed of a ſingle, rough, coriaceous, hemiſpherical leaf, undivided at the edge; the germen is ovate and ſmall; the ſtyle is five-pointed and longer than the cup, and the ſtigmata are ſingle and perſiſtent: the fruit is an oval nut (commonly called an acorn) covered with a coriaceous ſubſtance, the baſe of it being placed in the cup.

There are ſeveral ſpecies of oak, but the ſort which is moſt commonly known, grows naturally in England in many places. It is ſaid, that an oak-tree is an hundred years coming to its full growth, an hundred in perfection, and an hundred years decaying.

The great advantages ariſing from plantations of this tree, is ſo well known to the nation, that it is ſcarce neceſſary to inform the reader of its great uſe in civil and, particularly, naval architecture, there being no timber in the world ſo good for ſhip-building as the Engliſh oak, which makes our formidable fleets as much ſuperior in the ſtrength of their parts and for durability, as our ſeamen are in ſkill and courage to thoſe of other nations.

The bark of the oak-tree is of very great ſervice in tanning leather, and its acorns are excellent food for hogs.

The excellency of this noble plant is ſo univerſally known, that to offer any thing in order to encourage its greater increaſe, would be needleſs, ſeeing that all our gentlemen of fortune are not only judges of its great uſe, but at this time are principally devoted to the pleaſures and profit of planting in general, wherein the oak has a place not inferior to any.

This advantageous plant is raiſed from the acorn, which ſhould be ſown immediately after its falling from the tree, which is about the beginning of November; and is always beſt when the acorn is planted in the place appointed for its future growth: but when it cannot be ſo ordered, they muſt be ſown in a ſeed-bed, at about two or three inches aſunder in the rows, and nine or ten inches row from row. In the ſpring, the plants will appear, when they muſt be kept clear from weeds; and the following October they may be tranſplanted in rows three feet aſunder, and eighteen inches in the rows, obſerving not to ſuffer the plants to abide long out of the ground at the time of tranſplanting; here they may remain for three or four years, at which time they will be large enough to be tranſplanted where they are intended to remain for good: the ſeaſon for this work is in autumn, at which time, if they are carefully taken up, there will be little danger of their ſucceeding, but the heads ſhould by no means be ſhortened, which is too much practiſed; all that ſhould be done, is only to cut off any bruiſed or ill-placed branches, which ſhould be taken off cloſe to the place where they are produced.

The ſoil in which the oak-tree makes the greateſt progreſs, is a deep rich loam, in which it grows to the largeſt ſize; and the timber of thoſe trees which grow upon this land, is generally more pliable than that which grows on a ſhallow or drier ground, but the wood of the latter is much more compact and hard. Indeed, there are few ſoils in England in which the oak will not grow, provided there is proper care taken in their cultivation, though this tree will not thrive equally in all ſoils; but yet it might be cultivated to a national advantage, upon many large waſtes in ſeveral parts of England, as alſo to the great profit of the eſtates where theſe tracts of land now lie uncultivated and produce nothing to the owner.

The proper diſtance that oaks ſhould be planted from each other, in woods, groves, parks, &c. ſhould not be leſs than thirty feet.

There are a great number of trees that go under the name of oak in divers parts of the world, but there is no where ſo many different kinds as in America, though the wood is not near ſo valuable as the Engliſh oak.

In times of ſcarcity, a great many poor people have made bread of the acorns; and the poets tell us, they were the food of the golden-age: however, they are heavy, windy, and hard to digeſt; therefore mankind, in thoſe early ages, muſt doubtleſs have had a better digeſtion than us.

The leaves of the oak are ſtyptic, a little bitteriſh, and all parts of it are aſtringent; they have often been preſcribed in all ſorts of hæmorrhages and fluxes of the belly.

OAK *of Jeruſalem*, in botany. See the article CHENOPODIUM.

Poiſon-OAK. See TOXICODENDRUM.

OAKAM, old ropes untwiſted, and pulled out into looſe hemp, in order to be uſed in caulking the ſeams, tree-nails, and bends of a ſhip, for ſtopping or preventing leaks.

OAR, in navigation, a long piece of wood, made round where it is to be held in the hand, and thin and broad at the other end, for the eaſier cutting and reſiſting the water, and conſequently moving the veſſel, by rowing.

Oars for ſhips are generally cut out of fir-timber, thoſe for barges are made out of New-England or Dantzic rafters, and thoſe for boats, either out of Engliſh aſh, or fir-rafters from Norway. See the article ROWING.

OAT, *Avena*, in botany, a genus of plants, whoſe flowers grow in looſe particles; the cup is a bivalvular glume; the corolla conſiſts of two valves, the lower one being of the ſame ſize with the cup, putting out from the back a ſpiral awn or beard, which is jointed and reflexed: the ſtamina are three capillary filaments, topped with oblong forked antheræ: the corolla ſerves as a pericarpium, ſurrounding a ſingle ſeed, which is oblong and ſwelling, pointed at each end, having a longitudinal furrow, and ſhut up in the chaff.

There are three ſorts of oats cultivated in England, viz. the common or white oat, the black oat, and the brown or red oat; the firſt ſort is more common about London, the ſecond in the northern parts, and the red oats are cultivated in Derbyſhire, Staffordſhire, and Cheſhire, and are a very hardy ſort.

Oats are a very profitable grain, and abſolutely neceſſary, being the principal grain which horſes love, and are eſteemed the moſt wholeſome food for thoſe uſeful animals, it being ſweet and of an opening nature, other grains being apt to bind, which is injurious to labouring horſes.

Oats will thrive on cold barren ſoils which will produce no other ſort of grain, it will alſo grow on the hotteſt land; in ſhort, there is no land too rich or too poor for it, too hot or too cold, but it will grow on it; and in wet harveſts, when other grain is ſpoiled, this will receive but little or no damage; the ſtraw and huſks being of ſo dry a nature, that if they are houſed wet, they will not heat in the mow and become mouldy, as other grain uſually do.

The ſeaſon for ſowing oats is in February or March, according to the nature of the land, and as the ſeaſon is early or late.

The meal of this grain makes tolerable good bread, and is the common food of the country people in the north; and in the ſouth, it is eſteemed for pottage and other uſes. Thoſe who feed upon it, are generally very healthy, which is a ſign that it yields good nouriſhment. Oatmeal blunts the acrimony of the humours, is cooling, and carries off acrimoneous ſalts by the urinary paſſages: flummery with milk, is uſed by many as a cooling diet in hot weather; and water-gruel is every where known for its inoffenſive properties.

OATH, *Juſjurandum*, is a ſolemn affirmation, in which the perſons ſworn invoke the Almighty to witneſs that their teſtimony is true, renouncing all claim to his mercy, and calling for his vengeance if it be falſe; on which account ſuch an oath is termed ſacramentum, a holy band, or tie; and it is alſo called a corporal oath, becauſe the perſon who takes it, lays his right-hand on the book of the Evangeliſts.

All oaths muſt be adminiſtered by a perſon duly authorized, and in order to diſcover truth and right; and therefore, if a perſon not duly authorized, adminiſters an oath, he is puniſhable both with fine and impriſonment.

A perſon who is to be a witneſs in a cauſe, may have two oaths adminiſtered to him; the one to ſpeak the truth, in relation to what the court ſhall think fit to aſk him, concerning himſelf or any thing elſe that is not evidence in the cauſe; and the other purely to give evidence in the cauſe wherein he is produced as a witneſs; the former of which is called an oath upon a voyer dire.

By ſtatute, all that bear offices of any kind under the government, members of the houſe of commons, eccleſiaſtical perſons, members of colleges, ſchoolmaſters, ſerjeants at law, counſellors, attornies, ſollicitors, advocates, proctors, &c. are required to take the oath of allegiance, ſupremacy, and abjuration; all perſons neglecting, or refuſing, to take theſe oath, are declared to be incapable of executing their offices and employments, of ſuing at law, of being guardians, executors, &c. and are liable to the forfeiture of 500*l.* 13 W. III. c. 6. 1 Ann. c. 22. and 1 Geo. I. c. 13.

OBADIAH, or *the Prophecy of* Obadiah, a canonical book of the Old Teſtament, which is contained in one ſingle chapter, and is partly an invective againſt the cruelty of the Edomites, who mocked and derided the children of Iſrael, as they paſſed into captivity, and with other enemies, their confederates, invaded and oppreſſed thoſe ſtrangers, and divided the ſpoil among themſelves: and partly a prediction of the deliverance of Iſrael, and of the victory and triumph of the whole church over her enemies.

OBEDIENCE, or Obedientia, in the canon law, is ſometimes uſed for an office, or the adminiſtration of it. In our antient cuſtoms obedientia was uſed, in the general, for every thing that was enjoined the monks by the abbots: and in a more limited ſenſe it was applied to the farm belonging to the abbey, to which the monks were ſent vi ejuſdem obedientiæ, either to look after the farm, or collect the rents. Hence, theſe rents themſelves were alſo called obedientiæ.

OBELISCOTHECA, in botany, a name given to the rudbeckia of Linnæus. See the article Rudbeckia.

OBELISK, in architecture, a truncated, quadrangular, and ſlender pyramid, raiſed as an ornament, and frequently charged either with inſcriptions or hieroglyphics.

Obelisk, †, in grammar, a mark in form of a dagger, uſed to refer the reader to a note in the margin, at the ſide or bottom of a page.

OBJECT, in philoſophy, ſomething apprehended, or preſented to the mind, by ſenſation or by imagination.

Chauvinus defines an object to be that about which a power, act, or habit is employed: thus, good is the object of the will, truth of the underſtanding; and, in like manner, colour is the object of ſight, ſound of hearing, &c.

Object Glass *of a Teleſcope, or Microſcope,* the glaſs placed at the end of the tube which is next the object. See the articles Telescope and Microscope.

OBJECTION, ſomething urged to overthrow a poſition, or a difficulty raiſed againſt an allegation, or propoſition of a perſon we are diſputing withal.

OBJECTIVE is uſed, in the ſchools, in ſpeaking of a thing which exiſts no otherwiſe, than as an object known. The exiſtence of ſuch a thing is ſaid to be objective.

This word is alſo uſed for the power, or faculty, by which any thing becomes intelligible; and for the act itſelf, whereby any thing is preſented to the mind and known.

OBIT, among Chriſtians, a funeral ſolemnity, or office for the dead, moſt commonly performed when the corpſe lies in the church uninterred.

It likewiſe ſignifies the anniverſary office, or annual commemoration of the dead, performed yearly on the day of their death, with prayers, alms, &c. In religious houſes they have a regiſter, in which they enter the obits of their founders, or benefactors, which is thence termed the obituary.

OBLATI, in church-hiſtory, were ſecular perſons, who devoted themſelves and their eſtates to ſome monaſtery, into which they were admitted as a kind of lay-brothers. The form of their admiſſion was, putting the bell-ropes of the church round their necks, as a mark of ſervitude. They wore a religious habit, but differed from that of the monks.

OBLATION, a ſacrifice, or offering made to God. See Sacrifice.

OBLIGATION, in general, denotes any act whereby a perſon becomes bound to another, to do ſomething; as to pay a ſum of money, be ſurety, or the like.

Obligations are of three kinds, viz. natural, civil, and mixed. Natural obligations are entirely founded on natural equity; civil obligations, on civil authority alone, without any foundation in natural equity; and mixed obligations are thoſe which being founded on natural equity, are farther enforced by civil authority.

OBLIQUE, in geometry, ſomething aſlant, or that deviates from the perpendicular. Thus an oblique angle, is either an acute or obtuſe one, *i. e.* any angle except a right one. See Angle.

Oblique Ascension, in aſtronomy. See the article Ascension.

Oblique Cases, in grammar, are all the caſes except the nominative. See Case.

Oblique Descension, in aſtronomy. See the article Descension.

Oblique Line, that which, falling on another line, makes oblique angles with it, viz. one acute, and the other obtuſe.

Oblique Percussion, in mechanics. See the article Percussion.

Oblique Planes, in dialling, are thoſe which recline from the zenith, or incline towards the horizon. See the articles Dial and Plane.

The obliquity, or quantity of this inclination, or reclination, may be found by means of a quadrant.

Oblique Sailing, in navigation, is when a ſhip ſails upon ſome rhumb between the four cardinal points, making an oblique angle with the meridian; in which caſe, ſhe continually changes both latitude and longitude.

Oblique ſailing is of three kinds, viz. plain-ſailing, Mercator's ſailing, and great circle-ſailing. See the article Navigation.

Oblique Sphere, is where the pole is elevated any number of degrees leſs than 90°; in which caſe, the axis of the world, the equator, and parallels of declination will cut the horizon obliquely. See the article SPHERE.

OBLIQUITY *of the Ecliptic.* See the article ECLIPTIC.

OBLIQUUS, in anatomy, oblique, a name given to ſeveral muſcles, particularly in the head, eyes, and abdomen. See FRONTAL MUSCLES.

OBLONG, in general, denotes a figure that is longer than broad: ſuch is a parallelogram, ellipſis, &c. See the articles PARALLELOGRAM and ELLIPSIS.

OBLONGATA MEDULLA, in anatomy. See MEDULLA and BRAIN.

OBOLARIA, in botany, a genus of plants, whoſe flower is monopetalous and unequal; the tube is campanulated and ventricoſe, and the limb divided into four ſegments; it hath four awl-ſhaped ſtamina, two of which are larger than the others. The fruit is an oval, compreſſed, ventricoſe capſule, formed of two valves, containing a great number of ſeeds in form of very fine powder.

OBOLUS, in antiquity, an antient Athenian coin.

OBSCURE, ſomething that is dark and reflects little light, or that is not clear and intelligible.

Obſcurity, in this laſt ſenſe, ariſes from hence, that we do not conceive and expreſs things as they are, but as we judge them to be, before we have fully examined them.

OBSCURO, or CLARO-OBSCURO. See CLARO-OBSCURO.

OBSEQUIES, the ſame with funeral ſolemnities. See the articles BURIAL, FUNERAL, &c.

OBSERVANCE, in a monaſtic ſenſe, denotes a community of religious, tied to the perpetual obſervation of the ſame rule.

OBSERVATION, among navigators, ſignifies the taking the ſun's, or a ſtar's meridian altitude, in order thereby to find the latitude. See LATITUDE.

Cœleſtial OBSERVATIONS. See COELESTIAL.

OBSERVATORY, a place deſtined for obſerving the heavenly bodies; being, generally, a building erected on ſome eminence, covered with a terrace for making aſtronomical obſervations.

OBSIDIONALIS, an epithet applied by the Romans to a ſort of crown. See the article CROWN.

OBSTRUCTION, in medicine, ſuch an obturation of the veſſels, as prevents the circulation of the fluids, whether of the ſound and vital, or of the morbid and peccant kind, through them; ariſing from an exceſs of the bulk of the fluid to be tranſmitted, above the capacity of the veſſel which ought to tranſmit it.

OBTURATOR, in anatomy, a name for the two muſcles of the thigh, one of which is the marſupialis, and is called obturator internus, and the other the obturator externus. Theſe two muſcles ſhut up the foramen or aperture between the os pubis and the hip-bone. The obturator internus comes from the internal circumference of the hole that is between the iſchium and the os pubis; and paſſing through the ſinuoſity of the iſchium, it is inſerted into the dent of the great trochanter. Its tendon lies between the gemini: it turns the thigh to the outſide. The obturator externus comes from the external circumference of the ſame hole as the former; it embraces the neck of the thigh-bone, and paſſes under the quadratus to the ſmall cavity of the great trochanter.

OBTUSE, ſignifies blunt, dull, &c. in oppoſition to acute, ſharp, &c. thus we ſay obtuſe angle, obtuſe angled triangle, &c. See the article ANGLE, &c.

OCCATION, a term in the antient huſbandry, by which they expreſſed what we do by harrowing, though they performed it with a different inſtrument; being a kind of rake, with the teeth of which they levelled the ground, and broke the clods; and with the hand ſtrewed the corn over this level ground. Then they brought on the plough and ploughed it in, ſo that the grain was ſown in furrows, as we expreſs it, and uſually came up as we ſee it does at this time with us in the ſame caſe in the lower parts only. After it got a few leaves they went over the ground again with the ſame inſtrument, to clear away the weeds, and move the earth about the roots of the young plants.

OCCIDENT, in geography, the weſtward quarter of the horizon, or that part of the horizon where the ecliptic, or the ſun therein, deſcends into the lower hemiſphere, in contradiſtinction to orient. Hence we uſe the word occidental, for any thing belonging to the weſt, as occidental bezoard, occidental pearl, &c.

OCCULT, ſomething ſecret, hidden, or inviſible. The occult ſciences, are magic, necromancy, cabbala, &c.

OCCULT, in geometry, is uſed for a line that is ſcarce perceivable, drawn with the point of the compaſſes, or a leaden pencil. Theſe lines are uſed in ſeveral operations, as the raiſing of plans, deſigns of building, pieces of perſpective, &c. They are to be effaced when the work is finiſhed.

OCCULTATION, in aſtronomy, the time a ſtar or planet is hid from our ſight, by the interpoſition of the body of the moon, or of ſome other planet. See the article ECLIPSE.

Circle of perpetual OCCULTATION, is a parallel in an oblique ſphere, as far diſtant from the depreſſed pole, as the elevated pole is from the horizon. See the article HORIZON.

All the ſtars between this parallel and the depreſſed pole, never riſe, but lie conſtantly hid under the horizon of the place.

OCCUPANT, in law, the perſon that firſt ſeizes, or gets poſſeſſion of a thing; and this by law muſt be of what has a natural exiſtence, as of land, &c.

OCCUPATION, in a legal ſenſe, is taken for uſe or tenor, as in deeds it is frequently ſaid, that ſuch lands are, or lately were, in the tenure or occupation of ſuch a perſon. This is likewiſe uſed for a trade or myſtery.

OCCUPATION, or OCCUPANCY, in the civil law, denotes the poſſeſſion of ſuch things as at preſent properly belong to no private perſon; but are capable of being made ſo, as by ſeizing or taking of ſpoils in war, by catching things wild by nature, as birds and beaſts of game, &c. or by finding things before undiſcovered, or loſt by their proper owners.

OCEAN, in geography, that vaſt collection of ſalt and navigable waters, in which the two continents, the firſt including Europe, Aſia, and Africa, and the laſt America, are incloſed like iſlands. The ocean is diſtinguiſhed into three grand diviſions. 1. The Atlantic ocean, which divides Europe and Africa from America, which is generally about three thouſand miles wide. 2. The Pacific ocean, or South-ſea, which divides America from Aſia, and is generally about ten thouſand miles over: and 3. The Indian Ocean, which ſeparates the Eaſt-Indies from Africa, which is three thouſand miles over. The other ſeas, which are called oceans, are only parts or branches of theſe, and uſually receive their names from the countries they border upon.

OCHNA, in botany, a genus of plants, whoſe flower conſiſts of five roundiſh petals; the filaments are numerous, ſhort, and connivent, and topped with roundiſh antheræ. The fruit is a very large, truncated, and fleſhy receptacle, containing on each ſide a ſingle berry, with a ſingle oval ſeed.

OCHRE, *Ochra*, in natural hiſtory, a genus of earths, ſlightly coherent, and compoſed of fine, ſmooth, ſoft, argillaceous particles, rough to the touch, and readily diffuſible in water.

Ochres are of various colours, as red, yellow, blue, brown, green, &c. Of the red there are eleven ſpecies, of the yellow as many, of blue one, of brown two, of green one, and of black two. All which have, at one time or other, been uſed in painting.

OCIMUM, baſil, in botany. See the article BASIL.

OCTAETERIDES, in chronology, denotes a cycle of eight years, at the end of which, three entire lunar months were added.

This cycle was in uſe at Athens, till Meton diſcovered the golden number.

OCTAGON, or OCTOGON, in geometry, is a figure of eight ſides and angles: and this, when all the ſides and angles are equal, is called a regular octagon, or one which may be inſcribed in a circle. If the radius of a circle circumſcribing a regular octagon be $= r$, and the ſides of the octagon be $= y$; then $y = \sqrt{2r^2 - r\sqrt{2r^2}}$.

OCTAGON, in fortification, denotes a place that has eight baſtions. See the article FORTIFICATION.

OCTAHEDRON, or OCTAEDRON, in geometry, one of the five regular bodies, conſiſting of eight equal and equilateral triangles. See the article SOLID.

The ſquare of the ſide of the octahedron is to the ſquare of the diameter of the circumſcribing ſphere, as 1 to 2.

If the diameter of the ſphere be 2, the ſolidity of the octahedron inſcribed in it will be 1,33333, nearly.

The octahedron is two pyramids put together at their baſes, therefore its ſolidity may be found by multiplying the quadrangular baſe of either of them, by one third of the perpendicular height of one of them, and then doubling the product.

OCTANDRIA, the name of the eighth claſs in the Linnæan ſyſtem of botany: it comprehends all thoſe plants whoſe flowers are hermaphrodite and furniſhed with eight ſtamina or male parts in each. To this claſs belong the Indian creſs, knot-graſs, tree-primroſe, French willow, &c.

OCTANT, or OCTILE, in aſtronomy, that aſpect of two planets, wherein they are diſtant an eight part of a circle, or 45° from each other.

OCTOSTYLE, in the ancient architecture, is the face of an edifice adorned with eight columns.

The eight columns of the octoſtyle may either be diſpoſed in a right line, as in the Pantheon, and the pſeudodiptere temple of Vitruvius; or in a circle, as in the round monothere temple of Apollo Pythius at Delphi, &c.

OCULUS, the eye, in anatomy. See the article EYE.

ODE, in poetry, a ſong, or a compoſition proper to be ſung.

Among the antients, ode ſignified no more than ſongs; but with us they are very different things. The antient odes were generally compoſed in honour of their gods, as many of thoſe of Pindar and Horace.

Theſe had originally but one ſtanza, or ſtrophe, but afterwards they were divided into three parts, the ſtrophe, the antiſtrophe, and the epode. The prieſts going round the altar ſinging the praiſes of the gods, called the firſt entrance, when they turned to the left, the ſtrophe; the ſecond, turning to the right, they called antiſtrophe, or returning; and, laſtly, ſtanding before the altar, they ſung the remainder, which they called the epode.

ODOROUS, or ODORIFEROUS, appellations given to whatever ſmells ſtrongly, whether they be fetid or agreeable; but chiefly to things whoſe ſmell is briſk and agreeable.

ODYSSEE, ὀδυσσεια, a celebrated epic poem of Homer, wherein are related the adventures of Ulyſſes, in his return from the ſiege of Troy. See the articles EPIC and ILIAD.

The moral of the odyſſee is, that a perſon's abſence from home, ſo that he cannot have an eye to his affairs, occaſions great diſorders; and, accordingly, the hero's abſence is the principal and moſt eſſential action of the whole poem.

OECONOMICS, the art of managing the affairs of a family, or community; and hence the perſon who takes care of the revenues and other affairs of churches, monaſteries, and the like, is termed œconomus.

OECONOMY, οικονομια, denotes, the prudent conduct, or diſcreet and frugal management, whether of a man's own eſtate, or that of another.

Animal OECONOMY, comprehends the various operations of nature, in the generation, nutrition, and preſervation of animals.

OECUMENICAL, ſignifies the ſame with general, or univerſal; as œcumenical council, biſhop, &c.

OEDEMA, or PHLEGMATIC TUMOUR, in medicine and ſurgery, a ſort of tumour attended with paleneſs and cold, yielding little reſiſtance, retaining the print of the finger when preſſed with it, and accompanied with little or no pain. See the article TUMOUR.

OENANTHE, water-dropwort, in botany, a genus of plants, producing umbellated flowers, the univerſal corolla is difform and radiated; the proper flowers which form the diſc are hermaphrodite, and compoſed of five inflexo-cordated petals; thoſe of the rays are male, and have five large, unequal, bifid petals. The fruit is compoſed of two oval ſeeds, convex and ſtriated on one ſide, and plane on the other.

A ſpecies of this genus, called hemlock dropwort, grows naturally by the ſides of ditches and rivers in divers parts of England; it commonly grows four or five feet high, with ſtrong jointed ſtalks, which being broken, emit a yellowiſh fetid juice; the leaves are ſomewhat like thoſe of the common hemlock, but are of a lighter green.

This plant is one of the moſt poiſonous we know of; the juice, which is at firſt like milk, turns afterwards to a ſaffron colour; if a perſon ſhould ſwallow ever ſo little of this juice, it will ſo contract every part it touches, that there will immediately follow a terrible inflammation and gangrene; and what is worſe, there has not hitherto been found any antidote againſt it; for which reaſon it ought to be very carefully avoided.

OENELÆUM, in pharmacy, a mixture of wine and oil, uſually of thick black wine and oil of roſes; ſaid to be good for anointing wounds, to prevent an inflammation.

OENOTHERA, tree-primroſe, in botany, a genus of plants, whoſe flower conſiſts of four cordated plane petals, with eight ſubulated incurved filaments inſerted in the tube of the calyx, and terminated with oblong incumbent antheræ. The fruit is a four-cornered, cylindraceous capſule, formed of four valves, and the ſame number of cells, containing a number of naked, angulated ſeeds.

This genus comprehends the onagra of Tournefort.

OESOPHAGUS, in anatomy, the gula, or gullet, is a membranaceous canal, reaching from the fauces to the ſtomach, and conveying into it the food taken in at the mouth. Its figure is ſomewhat like that of a funnel, and its upper part is called by anatomiſts the pharynx. Its ſituation is almoſt exactly behind the aſpera arteria, and longitudinally with the vertebræ of the neck and back; but when it enters the cavity of the thorax, it turns a little to the right, on account of the aorta.

OFFICE, a particular charge or truſt, or a dignity attended with a public function.

OFFICE alſo ſignifies a place or apartment appointed for officers to attend in, in order to diſcharge their reſpective duties and employments.

OFFICE, in architecture, denotes all the apartments appointed for the neceſſary occaſions of a palace or great houſe; as kitchen, pantries, confectionaries, &c.

OFFICE, in the canon-law, is uſed for a benefice that has no juriſdiction annexed to it.

OFFICER, a perſon poſſeſſed of a poſt or office.

Commiſſion-OFFICERS, are thoſe appointed by the king's commiſſion; ſuch are all from the general to the cornet, incluſive, who are thus denominated in contradiſtinction to warrant officers, who are appointed by the colonel's or captain's warrant; as quarter-maſters, ſerjeants, corporals, and even chaplains and ſurgeons.

Field-OFFICERS are ſuch as command a whole regiment; as the colonel, lieutenant-colonel, and major.

General-OFFICERS are thoſe whoſe command is not limited to a ſingle company, troop, or regiment; but extends to a body of forces, compoſed of ſeveral regiments: ſuch are the general, lieutenant-general, major-generals, and brigadiers.

Staff-OFFICERS are ſuch as, in the king's preſence, bear a white ſtaff, or wand; and at other times, on their going abroad, have it carried before them by a footman bare-headed: ſuch are the lord-ſteward, lord-chamberlain, lord-treaſurer, &c.

The white ſtaff is taken for a commiſſion, and at the king's death each of theſe officers breaks his ſtaff over the hearſe made for the king's body, and thus lays down his commiſſion, and diſcharges all his inferior officers.

Subaltern OFFICERS are all who adminiſter juſtice in the name of ſubjects; as thoſe who act under the earl-marſhal, admiral, &c. In the army, the ſubaltern officers are the lieutenants, cornets, enſigns, ſerjeants, and corporals.

OFFICINAL, in pharmacy, an appellation given to ſuch medicines, whether ſimple or compound, as are required to be conſtantly kept in the apothecaries ſhops.

OFFING, or Offin, in the ſea-language, that part of the ſea a good diſtance from ſhore, where there is deep water, and no need of a pilot to conduct the ſhip: thus, if a ſhip from ſhore be ſeen ſailing out to ſeaward, they ſay, ſhe ſtands for the offing; and if a ſhip, having the ſhore near her, have another a good way without her, or towards the ſea, they ſay, that ſhip is in the offing.

OFF-SETS, in gardening, are the young ſhoots that ſpring from the roots of plants; which being carefully ſeparated, and planted in a proper ſoil, ſerve to propagate the ſpecies.

Off-Sets, in ſurveying, are perpendiculars let fall, and meaſuring from the ſtationary lines to the hedge, fence, or extremity of an encloſure.

OGEE, or O. G. in architecture, a moulding, conſiſting of two members, the one concave, and the other convex; or, of a round and a hollow, like an S. See the article Moulding and Cymatium.

OGIVE, in architecture, an arch, or branch of a gothic vault; which, inſtead of being circular, paſſes diagonally from one angle to another, and forms a croſs with the other arches.

OIL, *Oleum*, in natural hiſtory, an unctuous inflammable ſubſtance, drawn from ſeveral natural bodies, as animal and vegetable ſubſtances.

Oil-Mill, one that ſerves to bruiſe or break the nuts, olives, and other fruits and grains, whoſe juice is to be drawn by expreſſion, to make oil.

Oil-Nut. See the article Ricinus.

Oil-Tree. See Ricinus.

OINTMENT, or Unguent, in pharmacy and ſurgery. See Unguent.

OLDENLANDIA, in botany, a genus of plants, whoſe flower conſiſts of four oval patent petals, which are a little longer than the cup; it hath four ſtamina, topped with ſmall antheræ. The fruit is a round capſule, with two cells, which are filled with many ſmall ſeeds.

OLEA, the olive-tree, in botany. See the article Olive.

OLEAGINOUS, ſomething that partakes of the nature of oil, or out of which oil may be expreſſed.

OLEANDER, *Nerium*, in botany. See Nerium.

OLEASTER, *Elæagnus*, in botany. See the article Elæagnus.

OLECRANUM, in anatomy, the poſterior apophyſis of the ulna, ſerving to form the eminence of the elbow.

OLFACTORY Nerve, the firſt pair of the head; ſo called from their being the immediate inſtruments of ſmelling.

OLIBANUM, frankincenſe, in pharmacy, a dry reſinous ſubſtance, brought to us in detached pieces, or drops as it were, like thoſe of maſtic; but larger, and of a leſs pure and pellucid texture.

It is of a pale yellowiſh-white colour, but with ſome mixture of a browniſh caſt in it. It is moderately heavy; its ſmell is ſtrong, but not diſagreeable; and its taſte bitter, acrid, and reſinous.

The earlieſt accounts we have of any thing, tell us that frankincenſe was in uſe among the ſacred rites and ſacrifices; and it is uſed in many different parts of the world at this time, to the ſame purpoſes. As well, however, as the world has been at all times acquainted with the drug itſelf, we are not yet well acquainted with its hiſtory. The country which produces it is a much diſputed point among authors: ſome affirm it was never found any where but in Arabia, and there only in that part called Sabæa, or, from this famous product, Arabia Thurifera: others are for bringing it from Ethiopia; and others from other places. If we are uncertain as to the place whence the olibanum is brought, we are much more as to the tree that produces it.

Olibanum is greatly commended by many againſt diſorders of the head and breaſt, and againſt diarrhœas and dyſenteries, and profluvia of the menſes, and fluor albus. Its doſe is from ten grains to a drachm. It is eſteemed by many a ſpecific in pleuriſies, eſpecially when epidemic.

Externally it is uſed in fumigations for diſorders of the head, and againſt catarrhs; and is an ingredient in ſome plaſters. It is a noble balſam in conſumptions, given in ſubſtance, or diſſolved with the yolk of an egg, into the form of an emulſion. There is an oil made of it per deliquium, in the ſame manner as that of myrrh: this is done by putting the powder of it into the white of a boiled egg, in a cellar, till it runs into a liquor; this is eſteemed a great coſmetic, and deſtroyer of pimples in the face. Dioſcorides had his doubts about the internal uſe of olibanum in large doſes; he talks of its bringing on madneſs, and even death; but none of the other Greek writers ſay any thing of its ill qualities, nor do we at preſent know any of them.

OLIGARCHY, a form of government, wherein the adminiſtration of affairs is lodged in the hands of a few perſons.

OLIVARIA Corpora, in anatomy, two eminences of the medulla oblongata; ſo called from their reſembling an olive in ſhape.

OLIVE-Tree, *Olea*, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped; the tube is cylindraceous and the length of the cup, and the limb is divided into four ſegments, which ſpread open; the ſtamina are two ſhort ſubulated filaments, topped with erect antheræ. The fruit is a ſmooth, oval, unilocular drupe, incloſing an ovato-oblong wrinkled nut, with a kernel of the ſame ſhape.

There are ſeveral ſorts of olive trees; the manured kind has a ſmooth aſh-coloured bark and yellowiſh wood that has ſomewhat of a bitteriſh taſte. The leaves are placed oppoſite, by pairs, and are oblong and narrow, almoſt like thoſe of the willow, of a light green on their upper ſide, and hoary underneath. The flowers come out from the wings of the leaves in bunches, they are ſmall and white, and are ſucceeded by the fruit, which ripens in autumn in the ſouthern countries of Europe, where this plant is much cultivated. Olive trees will grow in almoſt any ſoil; in rich moiſt ground they grow larger than in poor land, but the fruit is of leſs eſteem, becauſe the oil made from it is not ſo good as that which is produced in a poorer ſoil. Chalky ground ſeems to ſuit them beſt, for the oil produced from trees growing on that kind of land is much finer, and will keep longer good, than any other. In this country, olive trees are kept more for curioſity than uſe; they are planted in pots or tubs, and preſerved in green-houſes in the winter. Olives are very oily and ſmooth, and therefore not good for the ſtomach, being apt to pall and relax it too much, as moſt things of the like properties generally do. This fruit is brought over to us pickled in ſalt and water, and the oil which is expreſſed from the fruit is alſo imported, and is of common uſe for ſallads, &c. it is accounted heating, emollient, and vulnerary, and good againſt coſtiveneſs and the gripes.

Wild-Olive, *Elæagnus*, in botany. See the article Elæagnus.

Olive-Colour, a yellow mingled with black. See Colour.

OLYMPIAD, ολυμπιας, in chronology, the ſpace or period of four years, whereby the Greeks reckoned time; for the epocha or commencement of which, ſee the article Epocha.

OLYMPIC Games, were ſolemn games, famous among the ancient Greeks, ſo called from Olympian Jupiter, to whom they were dedicated; and by ſome ſaid to be firſt inſtituted by Jupiter, after his victory over the ſons of Titan: others aſcribe this inſtitution to Hercules, not the ſon of Alcmena, but one of much greater antiquity; others to Pelops; and others, to Hercules the ſon of Alcmena. Theſe games were ſo conſiderable, that the Greeks made them their epocha, diſtinguiſhing their years by the return of the olympics.

OMBRE, a celebrated game at cards, borrowed from the Spaniards, and played by two, three, or five perſons, but generally by three.

Ombre de Soleil, ſhadow of the ſun, in heraldry, is when the ſun is borne in armory, ſo as that the eyes, noſe, and mouth, which at other times are repreſented, do not appear; and the colouring is thin, ſo that the field can appear through it.

OMEN, a certain accident and caſual occurrence, that was thought to preſage either good or evil.

OMENTUM, or Epiloon, the cawl, in anatomy, a membranaceous part, uſually furniſhed with a large quantity of fat; being placed under the peritonæum, and immediately above the inteſtines.

It is called by ſome rete, and reticulum, from the number of holes appearing in it, when raiſed, and giving it the reſemblance of a net.

As to its ſituation, it uſually occupies only the upper part of the abdomen; though it is ſometimes found extended to the lower part: its weight in a perſon not remarkably fat or lean, is about half a pound: its lower part is evidently looſe and free; but in its upper part it is joined, anteriorly, to the bottom of the ſtomach, the duodenum, and the ſpleen; and poſteriorly to the colon and pancreas.

It is compoſed of a very tender double membrane, forming a kind of pouch or cavity, called its burſa, and replete with fat, lodged in certain cellules, forming a kind of ducts, with certain areolæ, or membranaceous ſpaces between them.

Its arteries come from the cœliac, and are very numerous; its veins ariſe chiefly from the ſplenic branch of the vena portæ; and its nerves are from the intercoſtals and the par vagum. See the articles Artery, Vein, &c.

It has a very remarkable aperture, by which it may be conveniently diſtended by inflation; and there are generally ſome ſmall holes in it, though the large ones, from which it got the name rete, are adventitious.

The uſes of the omentum are, 1. by its lubricity, to render the natural and neceſſary motions of the inteſtines eaſy: 2. to cheriſh and defend the inteſtines from cold: 3. to aſſiſt in the formation of the bile, the fatty part of which is wholly owing to the veſſels of the omentum; every thing that returns from this part going to the liver: 4. to temperate the acrimony of the humours: and, probable, 5. to ſerve as all the other fat of the body, to give it nouriſhment, when it is incapable of being nouriſhed any other way.

OMPHALEA, in botany, a genus of plants, producing male and female flowers; the male flower hath no corolla; the cup is cut into four ſegments, and contains an ovate receptacle, on the ſide of which are placed two or three antheræ: the female flower is like the male, excepting the generative parts; it hath a very ſhort roundiſh germen, with a cylindric ſtyle, and a broad, obtuſe, and almoſt trifid ſtigma: the fruit is ovate, fleſhy, and trilocular, and the ſeeds are ſolitary and oblong.

ONAGRA, in botany, a name given by Tourneſort to the oenothera of Linnæus. See the article Oenothera.

ONANIA, or Onanism, terms which ſome late empirics have framed, to denote the crime of ſelf-pollution, mentioned in ſcripture to have been practiſed by Onan, and puniſhed in him with death.

ONDEE, in heraldry, the ſame with wavy. See Wavy.

ONEIROCRITICA, *ονειροκριτικη*, the art of interpreting dreams, or predicting future events from dreams.

ONGLEE, in heraldry, an appellation given to the talons or claws of beaſts or birds, when borne of of a different colour from that of the body of the animal.

ONION, *Cepa*, in botany, a genus of plants, having a bulbous root, conſiſting of various coats, the outermoſt of which are membranaceous, and the inner ones fleſhy, with many fibres at the bottom; the leaves are long, fiſtular, round, and ſharp at the points; the ſtalk is naked, upright, and riſing to about four or five feet high; it is hollow, and ſwells out in the middle, on the top of which the flowers are collected in a ſpherical head; each flower conſiſts of ſix oblong petals, with ſix ſubulated filaments, topped with oblong erect antheræ: the fruit is a broad, ſhort, three-cornered capſule, having three cells and three valves, and contains a number of roundiſh angular ſeeds, of a black colour.

Onions are propagated by ſowing their ſeeds in the ſpring, on good rich ſandy ground; and when they are grown up about three inches high, they ſhould be hoed out at about four or five inches aſunder, leaving them ſingly; this is beſt done in dry weather, which ſhould be repeated twice more, in order to keep the weeds from over-running them; in Auguſt the onions will be at their full growth, which is known by their blades falling to the ground, and ſhrinking; but before they are quite withered, they ſhould be drawn out, cropping off the extreme part of the blade and laying them on a dry ſpot, keeping them removed for a time till they are fit for houſing, where they may be kept for winter uſe; reſerving ſome of the firmeſt, largeſt, and beſt ſhaped, in the ſpring, to plant for ſeed, which, when run up, ſhould be ſtaked, to prevent the winds from blowing them down.

Onion-ſeed alſo may be ſown in beds in the month of Auguſt, for a ſupply in the ſpring; and likewiſe they may be ſown in the ſpring, in beds, to draw up for young ſallads, after the Michaelmas onions are grown too large for that purpoſe.

There are ſeveral ſorts of onions, as the Straſburgh onion, Spaniſh onion, Portugal onion, &c.

Onions are chiefly uſed for culinary purpoſes, and are eaten raw by ſome, and roaſted by others, but are more commonly boiled: they are windy, heating, and cauſe thirſt, and therefore are bad for hot conſtitutions; however, when boiled and mixed with honey, they are good in diſorders of the lungs, ariſing from a thick clammy phlegm: they are alſo in great eſteem to draw and ſuppurate all kinds of tumours; roaſted, and applied to the ear, they help to ripen, break, and cleanſe away, impoſthumations in the head, which ſometimes cannot be influenced by any other means: a cataplaſm of roaſted onions and freſh-butter, is an excellent external application for the piles.

This genus is included by Linnæus among the alliums, or garlic. See Allium.

ONOCLEA, in botany, a genus of plants of the fern kind, the fructifications of which grow in a cluſtered ſpike; it hath a globoſe unilocular capſule, opening with five valves, which are lanceolated and acute: the ſeeds are numerous, ſmall, duſty, and hairy.

ONOMATOPOEIA, in grammar and rhetoric, a figure where words are formed to reſemble the ſound made by the things ſignified; as the buz of bees, the cackling of hens, &c.

ONONIS, reſt-harrow, in botany, a genus of plants, producing papilionaceous flowers; the vexillum is cordated, ſtriated, and depreſſed on the ſides; the alæ are ovate, and ſhorter than the vexillum; and the carina is acuminated, and longer than the alæ: the fruit is a turgid, rhomboidal, unilocular pod, containing a few reniform ſeeds.

There are ſeveral ſpecies belonging to this genus, but the common ſort (known by the name of the prickly reſt-harrow) which grows naturally in many parts of England, with purple flowers, has a ſtrong creeping root, which ſpreads far in the ground; the ſtalks are ſlender, rough, reddiſh, hairy, and full of prickles; they are beſet with leaves of a roundiſh form, ſlightly crenated, hairy, of a dark green colour, and glutinous to the touch.

The root and leaves of this plant are accounted attenuant and diſcutient, being chiefly preſcribed in the piles, jaundice, and obſtructions of the viſcera.

ONOPORDUM, woolly-thiſtle, in botany, a genus of plants, producing compound tubuloſe flowers; the proper ones are monopetalous and funnel-ſhaped: the ſeeds are ſingle, crowned with a hairy down, and placed in the cup.

The common onopordum, which grows naturally in many parts of England, is a biennial plant, with many large downy leaves, which are ſinuated at their edges, and are prickly; the ſtalks are four or five feet high, dividing upwards into many branches, and are terminated by ſcaly heads of purple flowers, which come out in June.

This ſpecies is ſaid to be good againſt cancers, &c.

ONOSMA, in botany, a genus of plants, whoſe flower is monopetalous and campanulated, with a very ſhort tube; the ſtamina are five ſhort ſubulated filaments, topped with erect arrow-ſhaped antheræ: there is no pericarpium; but the cup, which is immutable, contains four ovate ſeeds.

ONTOLOGY, or ONTOSOPHY, the ſcience or doctrine of being, in the general or abſtract; coinciding with what is otherwiſe called metaphyſics.

ONYX, in natural hiſtory, one of the ſemi-pellucid gems, with variouſly coloured zones, but none red; being compoſed of cryſtal, debaſed by a ſmall admixture of earth; and made up either of a number of flat plates, or of a ſeries of coats ſurrounding a central nucleus, and ſeparated from each other by veins of a different colour, reſembling zones or belts.

OOST, a kiln for drying hops after they are picked from the ſtalks.

OPACITY, in philoſophy, a quality of bodies which renders them impervious to the rays of light. See LIGHT.

OPAL, in natural hiſtory, a gem of a very peculiar kind, and has been eſteemed by many, in all ages, of very great value; though at preſent it is of leſs value, in proportion to its ſize, than any of the finer gems.

It is ſofter than any other of the fine gems, and is difficult to poliſh to any degree of nicety: it is found of various ſhapes and ſizes; its moſt frequent bigneſs is between that of a pea and a horſe-bean; but it is found as ſmall as the head of a large pin, and has been ſeen of the ſize of a large walnut. Its figure is very various and uncertain, but it is never found in a chryſtalliform or columnar ſtate; its moſt uſual ſhape is an irregularly oblong one, convex above, flatted at bottom, and dented with various ſinuoſities at its ſides.

It is often found among the looſe earth of mountains, ſometimes on the ſhores of rivers, and not unfrequently bedded in the coarſer kinds of jaſper. It is found in Egypt, Arabia, ſome parts of the Eaſt-Indies, and in many parts of Europe; thoſe of Europe are principally from Bohemia, and are of a greeniſh or greyiſh colour; the colour of other opals much reſemble the fineſt mother of pearl, its baſis ſeeming a bluiſh or greyiſh white, but with a property of reflecting all the colours of the rainbow, as turned differently to the light.

OPALIA, in antiquity, feaſts celebrated at Rome in honour of the goddeſs Ops.

OPEN FLANK, in fortification, that part of the flank which is covered by the orillon. See the article FLANK.

OPENING *of Trenches*, is the firſt breaking of ground by the beſiegers, in order to carry on their approaches towards a place. See TRENCH.

OPERA, a dramatic compoſition ſet to muſic, and ſung on the ſtage, accompanied with muſical inſtruments, and enriched with magnificent dreſſes, machines, and other decorations.

OPERATION, in general, the act of exerting or exerciſing ſome power or faculty, upon which an effect follows.

OPERATION, in ſurgery and medicine, denotes a methodical action of the hand on the human body, in order to re-eſtabliſh health.

OPERATIONS, in chemiſtry, denote the proceſſes or experiments whereby bodies are changed agreeably to the rules of the art, and to the end propoſed therein.

OPHIOGLOSSUM, adder's-tongue, in botany, a genus of cryptogamious plants of the fern kind; the root hath many fibres gathered together, from which ariſe, on a pedicle, a ſingle leaf, which is fleſhy, ſmooth, upright, and without nerves; from that part of the leaf that joins to the pedicle, there proceeds a ſpike which reſembles a ſerpent's tongue, that terminates in a point, and is dentated on each ſide like a file; it is divided into ſeveral ſmall cells, which contain a great number of very ſmall oval ſeeds, like meal or duſt, which are thrown out when ripe.

Adder's-tongue grows wild, in moiſt meadows, in ſeveral parts of England; it is accounted a vulnerary, and is uſed both externally and internally, and is thought to be good for ulcers when bruiſed and applied as a cataplaſm.

OPHIORHIZA, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped, and the limb cut into five obtuſe patent ſegments; it hath five ſlender filaments, topped with oblong antheræ. The fruit is a broad bilobate capſule, containing many angulated ſeeds.

OPHIOXYLON, in botany, a genus of the polygamia-monoecia claſs of plants, the hermaphrodite flowers are monopetalous and infundibuliform, with five very ſhort filaments topped with pointed antheræ; the male flower hath a cylindric nectarium in the mouth of the corolla, with two very ſhort ſtamina. The fruit is a double berry, having two cells, and the ſeeds are ſolitary and roundiſh.

OPHITES, in natural hiſtory, a ſort of variegated marble, of a duſky-green ground, ſprinkled with ſpots of a lighter green, otherwiſe called ſerpentine.

OPHITES, in church hiſtory, Chriſtian heretics, ſo called from the veneration they had for the ſerpent that tempted Eve, and the worſhip they paid to a real ſerpent: they pretended that the ſerpent was Jeſus Chriſt, and that he taught men the knowledge of good and evil: they diſtinguiſhed between Jeſus and Chriſt; Jeſus, they ſaid, was born of the Virgin, but Chriſt came down from heaven to be united with him: Jeſus was crucified, but Chriſt had left him, to return to heaven. They diſtinguiſhed the God of the Jews, whom they termed Jaldabaoth, from the ſupreme God; to the former they aſcribed the body, to the latter the ſoul of men. They had a live ſerpent, which they kept in a kind of cage; at certain times they opened the cage door and called the ſerpent; the animal came out, and mounting upon the table, twined itſelf about ſome loaves of bread; this bread they broke, and diſtributed it to the company, who all kiſſed the ſerpent: this they called their euchariſt.

OPHRYS, twyblade, in botany, a genus of plants, whoſe flower conſiſts of five oblong petals, four of which are aſcendend, and join, and the lower one is bifid; it hath a dependent nectarium, which is carinated; behind the ſtamina are two very ſhort filaments, topped with erect antheræ. The fruit is an oval, three-cornered, obtuſe capſule, with one cell, opening with three valves, containing a great number of ſmall ſeeds like duſt.

OPHTHALMIA, οφθαλμια, in medicine, an inflammation of the membranes which inveſt the eye; eſpecially of the adnata, or albugineous coat. See the article EYE.

OPHTHALMICS, medicines good in diſorders of the eyes. See EYE.

OPHTHALMIC NERVES, the fifth pair of the head. See the article NERVE.

OPIATES, medicines of a thicker conſiſtence than a ſyrup, prepared with opium ſcarcely fluid. They conſiſt of various ingredients, made up with honey or ſyrup; and are to be uſed for a long time either for purgative, alterative, or corroborative intentions. Hence there are opiates of three kinds; that is, of a purgative, an alterative, and of a corroborating quality.

OPINION, is defined to be an aſſent of the mind to propoſitions not evidently true at firſt ſight.

OPIUM, in the materia medica, is an inſpiſſated juice, partly of the reſinous, and partly of the gummy kind, brought to us in cakes from eight ounces to a pound weight. It is very heavy, of a denſe texture, and not perfectly dry; but in general, eaſily receives an impreſſion from the finger: its colour is a browniſh yellow, ſo very dark and duſky that at firſt ſight it appears black: it has a dead and faint ſmell, and its taſte is very bitter and acrid. It is to be choſen moderately firm, and not too ſoft; its ſmell and taſte ſhould be very ſtrong, and care is to be taken that there is no dirty or ſtony matter in it.

Opium is the juice of the papaver album, or white poppy, with which the fields of Aſia Minor are in many places ſown, as ours are with corn. When the heads are near ripening, they wound them with an inſtrument that has five edges, which on being ſtuck into the head makes at once five long cuts in it; and from theſe wounds the opium flows, and is next day taken off by a perſon who goes round the field, and put up in a veſſel which he carries faſtened to his girdle: at the ſame time that this opium is collected, the oppoſite ſide of the poppy head is wounded, and the opium collected from it the next day. They diſtinguiſh however the produce of the firſt wounds from that of the ſucceeding ones, for the firſt juice afforded by the plant is greatly ſuperior to what is obtained afterwards. After they have collected the opium, they moiſten it with a ſmall quantity of water or honey, and work it a long time upon a flat, hard, and ſmooth board, with a thick and ſtrong inſtrument of the ſame wood, till it becomes of the conſiſtence of pitch; and then work it up with their hands, and form it into cakes or rolls for ſale.

Opium at preſent is in great eſteem, and is one of the moſt valuable of all the ſimple medicines: applied externally it is emollient, relaxing and diſcutient, and greatly promotes ſuppuration; if long kept upon the ſkin it takes off the air, and always occaſions an itching in it; ſometimes it exulcerates it, and raiſes little bliſters if applied to a tender part. Laid on the perinæum it promotes venereal inclinations; and ſometimes, on external application, it allays pain, and even occaſions ſleep: but it muſt by no means be applied to the head, eſpecially to the ſutures of the ſkull, for it has been known to have the moſt terrible effects in this application, and even to bring on death itſelf.

Opium, taken internally, removes melancholy, eaſes pain and diſpoſes to ſleep; in many caſes removes hæmorrhages, provokes ſweating, and is a provocation to venery; and in general has a greater effect on women and children than on men. A moderate doſe is commonly under a grain, though according to the circumſtances two grains, or even three may be within the limits of this denomination; but cuſtom will make people bear a dram or more, tho' in this caſe nature is vitiated, and nothing is to be hence judged in regard to others. If given diſſolved, it operates in half an hour; if in a ſolid form, as in pills, or the like, it is ſometimes an hour and a half. Its firſt effect, in this caſe, is the making the patient cheerful, as if he had drank moderately of wine, and at the ſame time bold and above the fear of danger; for which reaſon the Turks always take it, when they are going to battle. A very immoderate doſe brings on a ſort of drunkenneſs, much like that occaſioned by an immoderate quantity of ſtrong liquors; cheerfulneſs and loud laughter at firſt, then a relaxation of the limbs, a loſs of memory, and lightheadedneſs; then vertigoes, dimneſs of the eyes, with a laxity of the cornea and a dilatation of the pupils, a ſlowneſs of the pulſe, redneſs of the face, relaxation of the under jaws, ſwelling of the lips, difficulty of breathing, painful erection of the penis, convulſions, cold ſweats, and finally death. Thoſe who eſcape are uſually relieved by a great number of ſtools, or profuſe ſweats. People who have gradually accuſtomed themſelves to an immoderate uſe of opium, are ſubject to relaxations and weakneſſes of all the parts of the body: they are apt to be faint, idle and thoughtleſs; and are generally in a ſtupid and uncomfortable ſtate, except juſt after they have taken a freſh doſe, in ſhort, they loſe their appetite, and grow old before their time.

Prepared opium, commonly called extract of opium, is made by diſſolving opium in a ſufficient quantity of water with a gentle heat; then ſtraining the ſolution from the fæces, and evaporating it to the conſiſtence of honey. Tincture of opium, or liquid laudanum, otherwiſe called the thebaic tincture, is made as follows: take of prepared opium two ounces; of cinnamon and cloves, each one drachm; of white-wine, one pint: infuſe them a week without heat, and then filtre it through paper. Quincy obſerves of this preparation, that the addition of the ſpices are of no uſe.

OPOBALSAMUM, in the materia medica, the ſame with the true balſam. See the article BALSAM.

OPOPANAX, in the materia medica, is a gum-reſin of a tolerably firm texture, uſually brought to us in looſe granules or drops, and ſometimes in large maſſes, formed of a number of theſe, connected by a quantity of matter of the ſame kind; but theſe are uſually loaded with extraneous matter, and are greatly inferior to the pure looſe kind. The drops or granules of the fine opopanax, are on the outſide of a browniſh red-colour, and of a duſky-yellowiſh or whitiſh colour within: they are of a ſomewhat unctuous appearance, ſmooth on the ſurface, and are to be choſen in clear pieces, of a ſtrong ſmell, and acrid taſte.

Opopanax is attenuating and diſcutient, and is gently purgative; it diſpels flatulencies, and is good in aſthmas, in inveterate coughs, and in diſorders of the head and nerves. It alſo promotes the menſes, and is good againſt all obſtructions of the viſcera.

OPOSSUM, in zoology, a ſpecies of didelphis, with the paps within the abdomen. See DIDELPHIS.

The opoſſum is a very ſingular animal, about fifteen inches long from the extremity of the noſe to the rump; and its tail is equal in length to the whole body: the legs are robuſt, and the feet armed with ſharp, long and crooked claws. But what is moſt ſingular in this animal, is that the ſkin of the belly of the female is looſe, forming a kind of pouch or bag, with an aperture in it, at which, in time of danger, it takes in its young.

OPPONENT, a perſon who withſtands or oppoſes another.

This term is chiefly uſed in ſcholaſtic or academic diſputes or exerciſes, where a perſon who oppoſes a theſis, or impugns it by his objections, is called opponent.

OPPOSITES, *Oppoſita*, among logicians, ſimply taken, are ſuch things as differ among themſelves, but ſo as not to differ in like manner from ſome third.

OPPOSITION, in logic, the diſagreement between propoſitions, which have the ſame ſubject and the ſame predicate.

OPPOSITION, in aſtronomy, is that aſpect or ſituation of two ſtars or planets, wherein they are diametrically oppoſite to each other, or 180° aſunder.

OPPOSITION, in geometry, the relation of two things, between which a line may be drawn perpendicular to both.

OPPOSITION, in rhetoric, a figure whereby two things are joined, which ſeem incompatable; as *a wiſe folly*.

OPTATIVE MOOD, in grammar, that which ſerves to expreſs an ardent deſire or wiſh for ſomething. See the article MOOD.

OPTICS, *Optica*, taken properly and ſimply, is that ſcience which teaches the properties of direct viſion; but in a larger ſenſe, it may comprehend the whole doctrine of light and colours, and all the phænomena of viſible objects. In this large ſenſe, the incomparable Sir Iſaac Newton calls his book of light and colours, optics; or it is a mathematical ſcience that treats of light in general, and of every thing that is ſeen with direct rays; and explains the ſeveral properties and effects of viſion in general, and properly of that which is direct and ordinary. For when the rays of light are conſidered as reflected, the ſcience which teaches their laws and properties, is called catoptrics; and when the refraction of rays is conſidered, and the laws and nature of it explained and demonſtrated, the ſcience is called dioptrics. So that optics comprehends the whole, of which catoptrics and dioptrics are the two parts.

OPULUS, marſh elder, in botany, an umbelliferous plant, growing naturally in marſhy lands in ſeveral parts of England; it riſes to the height of ſixteen or eighteen feet, and is divided into ſeveral branches which come out oppoſite, and are apt to grow irregular; they are covered with a ſmooth aſh-coloured bark, are very tender and brittle, and full of a white ſpungy pith: the leaves are placed oppoſite, and are large and angular, jagged on their edges, and of a light green. The flowers are monopetalous and campanulated, quinquifid at the limb, and reflexed; they come out at the ends of the branches in June, and grow in large umbels; they are of a white colour, and are ſucceeded by oval berries, which when ripe are of a ſcarlet colour.

OPUNTIA, the Indian fig, in botany, a genus of plants, whoſe flower is compoſed of ſeveral obtuſe, concave petals, placed in a circular order; the filaments are numerous, ſubulated, inſerted in the cup, and terminated by oblong erect antheræ; the fruit is a fleſhy umbilicated berry, with one cell containing a number of ſmall roundiſh ſeeds. There are ſeveral kinds of opuntia, which are all natives of America; they are armed with ſpines, which come out in cluſters on the ſides of the leaves, or rather branches, as they have no proper leaves; they grow either in a ramoſe form in ſome ſpecies, or dichotomous in others, and are kept in our green-houſes among other ſucculent plants, for the ſingularity of their appearance. Theſe plants are eaſily propagated by cutting off their branches, at the joints, in the ſummer months, which ſhould be laid in a warm dry place for ſometime to heal the wounded part; after which they may be planted in a dry rubbiſh ſoil, giving them but little water, as they are very ſucculent, which would otherwiſe rot them; and to have them in perfection, they ſhould not be expoſed to the open air at any time, for they thrive much better when kept under glaſſes. It is on a ſpecies of opuntia that the cochineal animal feeds. See cochineal. This genus is included by Linnæus, among the cactus, which ſee.

OR, in heraldry, denotes yellow or gold-colour. See Colour and Metal.

ORACLE, among the heathens, was the anſwer which the gods were ſuppoſed to give to thoſe who conſulted them upon any affair of importance; it is alſo uſed for the god who it was thought gave the anſwer, and the place where it was given.

ORACH, *Atriplex*, in botany. See the article Atriplex.

ORAL, ſomething delivered by word of mouth, without being committed to writing; in which ſenſe we ſay, oral law, oral tradition, &c.

ORANGE, *Aurantium*, in botany, an ever-green-tree; it hath a thick, woody, branched root, which ſpreads very much, and is of a yellow colour withinſide; the trunk is hard, whitiſh within, has an agreeable ſmell, and is covered with a browniſh ſmooth bark; the branches are numerous, flexible, of a beautiful green, and armed with a few thorns; the leaves are thick, ſmooth, broad, of an oval-lanceolated form, ending in a point with a foliated pedicle, in the ſhape of a heart (by which it is diſtinguiſhed from the lemon and citron trees) and when held up to the light there appears a ſort of ſmall holes in them: the flowers grow in bunches, and are roſaceous, each conſiſting of a monophyllous cup, indented in five parts: the corolla is compoſed of five white, oblong, patent petals, with many filaments, topped with yellow oblong antheræ; in the center is placed an orbicular germen, which ſuſtains a cylindrical ſtyle, crowned with a globoſe ſtigma, becoming afterwards a well-known globular fleſhy fruit, divided into nine cells, each containing two oval callous ſeeds.

There are ſeveral kinds of orange-trees, as the Seville orange, the China orange, the willow-leaved orange, the ſhaddock orange, the dwarf or nutmeg orange, the curled-leaved orange, the ſtriped curled-leaved orange, the double-flowering orange, the horned orange, the large-warted orange, with other varieties, which are cultivated in England more for curioſity than uſe.

Orange-trees are propagated by inoculation, on ſtocks raiſed from the kernels, which ſhould be ſown on a moderate hot-bed, in the ſpring; and when the plants are up three or four inches, they ſhould be planted ſingly in ſmall pots in good rich earth, and plunged into a freſh bed, obſerving to keep them ſhaded till they are properly rooted, and alſo to keep them well watered in hot-weather; in autumn they ſhould be put in the green-houſe, where they may remain till the ſpring, when it would not be amiſs to plunge them again in a moderate hot-bed which will greatly facilitate their growth; and by hardening them by degrees as the ſummer advances, they will be fit for inoculation in Auguſt, which is the proper ſeaſon for that operation on this plant; at which time, choice ſhould be made of cuttings from healthy and fruitful trees, obſerving that the ſhoots are round and the buds not ridged, ſuch ſeldom ſucceeding. When the ſtocks are inoculated, they ſhould be plunged in a moderate warmth, whether tan or dung (tan is beſt) and covered with glaſſes, giving proper air at times: in about a month it will be diſcoverable what buds have taken (at which time the bandage ſhould be looſened); after which, they ſhould be ſheltered in the green-houſe, and in the ſpring, headed down within two or three inches of the bud, which will ſoon put forth its ſhoot, which ſhoot ſhould be trained, by degrees, as it advances, in order to form a handſome tree; as they increaſe in ſize, they ſhould occaſionally be ſhifted into larger pots; once in two years will be ſufficient.

If old orange-trees have been miſmanaged, ſo as their tops are become unſightly or partly decayed, the beſt method to reſtore them, is to take them out of the tubs or pots in the ſpring, pruning their roots and heads, plant them into freſh earth, and plunge them into a tan-bed in a hot-houſe, where they may continue the ſucceeding ſummer and winter, by which time they will have renewed their heads; when they may be placed among the others which are in good order.

Orange-trees may alſo be trained againſt a wall, in the manner peaches are, and frames of glaſs placed ſlopewiſe over them in winter, which may be ſo contrived as to be removed quite away in ſummer; by this method the fruit will be very large, and more numerous than thoſe kept in the common way; alſo the fruit will ripen well, and be fit for uſe; but it will be proper to have a flue in the front in winter (an iron or tin one is beſt, as it can eaſily be moved away in ſummer) by which means there will be no hazard of loſing the trees in ſevere winters.

The flowers of orange-trees are juſtly eſteemed one of the fineſt perfumes, and though little uſed in medicine, yet the water diſtilled from them is accounted ſtomachic, cordial, and carminative. The peel of oranges is an excellent bitter, it ſtrengthens the ſtomach, helps digeſtion, attenuates groſs humours, diſcuſſes wind, and eaſes the cholic; it is an ingredient in tinctures, which, mixed with wine and drank before dinner, creates an appetite: the eſſential oil diſtilled from the rind, is alſo proper for the ſame uſes when two or three drops are taken upon ſugar, as well as the peel when it is candied. The pulp of ſweet oranges is cooling, quenches thirſt, and excites the appetite; but the juice of ſour oranges, not only ſerves to make a cooling drink in hot weather, but is of late found to be excellent againſt the ſcurvy.

Mock-ORANGE, *Philadelphus*, in botany. See PHILADELPHUS.

ORANGE-COLOUR, among dyers, one that partakes equally of red and yellow. See the articles COLOUR and DYEING.

ORANGERY, in gardening, a green-houſe, purpoſely adapted for the preſervation of orangtre es in winter: it alſo denotes a well ſheltered place, where orange trees are placed without doors in the ſummer ſeaſon.

ORATION, in rhetoric, a ſpeech or harangue, compoſed according to the rules of oratory, and ſpoke in public.

ORATORY, *Oratoria*, the art of ſpeaking well, otherwiſe called rhetoric. See the article RHETORIC.

ORB, *Orbis*, in aſtronomy, &c. denotes an hollow globe or ſphere. See the articles GLOBE and SPHERE.

ORBICULARE Os, in anatomy, a little bone of the ear, ſo called from its figure. See the article EAR.

ORBICULARIS, in anatomy, an appellation given to the conſtrictor-muſcle of the lips; as alſo to the conſtrictor of the upper eye-lid, which is ſingle, and riſes from the upper apophyſis of the maxillary bone, near the larger canthus of the eye, and ſurrounds the eye-lid with a ſeries of orbicular fibres, ſerving to ſhut it; and, in this action, it alſo depreſſes and draws forward the eye-brow, and elevates the lower eye-lid.

Some alſo give the name of orbicularis inteſtini, to the ſphincter of the anus.

ORBIS MAGNUS, in aſtronomy, denotes the earth's orbit, in its annual revolution round the ſun.

ORBIT, *Orbita*, in aſtronomy, the path of a planet or comet, or the curve that it deſcribes in its revolution round its central body: thus the earth's orbit is the curve which it deſcribes in its annual courſe, and uſually called the ecliptic. See the article ECLIPTIC.

ORCHARD, a plantation of fruit-trees. In planting an orchard, great care ſhould be taken that the ſoil is ſuitable to the trees planted in it; and that they are procured from a ſoil nearly of the ſame kind, or rather poorer than that laid out for an orchard. As to the ſituation, an eaſy riſing ground, open to the ſouth-eaſt, is to be preferred. Mr. Miller recommends planting the trees fourſcore feet aſunder, but not in regular rows; and would have the ground between the trees plowed, and ſown with wheat and other crops, in the ſame manner as if it was clear from trees, by which means the trees will be more vigorous and healthy, will abide much longer, and produce better fruit. If the ground has been paſture, the green-ſward ſhould be plowed in the ſpring before the trees are planted; and if it be ſuffered to lie a ſummer fallow, it will greatly mend it, provided it be ſtirred two or three times to rot the graſs and prevent the growing of weeds. At Michaelmas it ſhould be plowed pretty deep, in order to make it looſe for the roots of the trees, which if the ſoil be dry, ſhould be planted in October; but if it be moiſt, the beginning of March will be a better ſeaſon. If ſeveral ſorts of fruit trees are to be planted on the ſame ſpot, you ſhould obſerve to plant the largeſt growing trees backwards, and ſo proceed to thoſe of leſs growth, continuing the ſame method quite through the whole plantation; by which means the ſun and air will more eaſily paſs through the whole orchard. When you have planted the trees, you ſhould ſupport them with ſtakes, to prevent their being blown out of the ground by the wind; and the following ſpring, if the ſeaſon ſhould prove dry, cut a quantity of green turf, and lay it about the roots, with the graſs downwards; by which means a great expence of watering will be ſaved; and after the firſt year they will be out of danger. Whenever you plow the ground betwixt theſe rrees, you muſt be careful not to go too deep amongſt their roots, which would greatly damage the trees; but if you do it cautiouſly, your ſtirring the face of the ground will be of great ſervice to them: though you ſhould obſerve, never to ſow too near the tree, nor to ſuffer any great rooting weeds to grow about them; becauſe this would ſtarve them, by exhauſting the goodneſs of the ſoil, which every two or three years ſhould be mended with dung or other manure, that will be abſolutely neceſſary for the crops ſown between. Theſe trees, after they are planted out, will require no other pruning beſides cutting off their bad branches, or ſuch as croſs each other.

ORCHESTRA, in the antient theatres, a place in the form of a ſemi-circle, where the dancing was performed.

ORCHIS, in botany, a genus of plants, whoſe flower hath five petals with a nectarium of a corniculated form, with two very ſhort ſlender filaments joining to the pointal, with oval erect antheræ. The fruit is an oblong unilocular capſule, with three carinated valves opening on the ſides, but cohering at the top and bottom, the ſeeds are numerous and very ſmall like duſt. There are ſeveral ſpecies of orchis which grow wild in divers parts of England; the odd appearance and beauty of their flowers makes them well deſerving of a place in gardens; they are propagated by their roots, which are compoſed of two tubercles almoſt round, fleſhy, and of the ſize of nutmegs; the leaves are in moſt ſorts oblong, ſome of which are ſpotted; the ſtalks riſe to the height of a foot, and are round, ſtreaked, and encompaſſed with one or two leaves; and on the top is placed a ſpike of flowers in May or June. Orchis is accounted a reſtorative and ſtrengthener in weak decaying conſtitutions.

ORDEAL, a form of trial, or of diſcovering innocence or guilt, formerly practiſed over almoſt all Europe, and which prevailed in England from the time of Edward the confeſſor, till it was aboliſhed by a declaration of Henry III. It was called purgatio vulgaris, or judicium, in oppoſition to bellum or combat, the other form of purgation; and was of various kinds, as that of fire, that of red hot iron, that of water, that of judicial pottage, that of hallowed cheeſe, that of the green croſs, and that of dice laid on relics covered with a woollen cloth. To each of which kinds particular maſſes were appointed.

In England, an offender, on being arraigned and pleading not guilty, had it in his choice to put himſelf upon God and his country; that is upon the verdict of a jury; or upon God alone, on which account it was called the judgment of God, it being preſumed that God would deliver the innocent. The more popular kinds of ordeal were thoſe of red-hot iron and water; the firſt for freemen and people of faſhion, and the laſt for peaſants. That by fire as practiſed here, was the perſon's walking bare-footed and blindfold over nine red-hot plough ſhares; and if he eſcaped unhurt, he was acquitted, otherwiſe condemned. That of water was of two kinds, viz. either with hot water or cold; the former was where the perſon ſuſpected put his arm or leg into ſcalding water, and brought it out unhurt; and the latter was when his body was not, contrary to the courſe of nature, borne up by the water.

ORDER, in architecture, is a ſyſtem of the ſeveral members, ornaments and proportions of columns and pilaſters; or a regular arrangement of the projecting parts of a building, eſpecially the column, ſo as to form one beautiful whole.

M. Le Clerc defines an order to be a column charged with an intablature, and ſupported on a pedeſtal.

ORDER is alſo uſed for a diviſion or claſs of any thing: thus the tribe of animals called birds, is ſubdivided into ſix orders. See the article ORNITHOLOGY.

Holy ORDERS, a character peculiar to eccleſiaſtics, whebrby they are ſet apart for the miniſtry. See ORDINATION.

Military ORDERS, are companies of knights, inſtituted by kings and princes; either for defence of the faith, or to confer marks of honour, and make diſtinctions among their ſubjects.

Religious ORDERS, are congregations or ſocieties of monaſtics, living under the ſame ſuperior, in the ſame manner, and wearing the ſame habit.

ORDERS of curves, in geometry. See the article CURVE.

ORDINANCE, or ORDONNANCE, a law ſtatute, or command of a ſovereign, or ſuperior: thus the acts of parliament are ſometimes termed ordinances of parliament.

ORDINARY, or *honourable* ORDINARY, in heraldry, a denomination given to certain charges properly belonging to that art. The honourable ordinaries are ten in number; viz. the chief, pale, bend, feſſe, bar, croſs, ſaltier, chevron, bordure, and orle. For which ſee CHIEF, PALE, &c.

ORDINATES, or ORDINATE APPLICATES, in geometry, are parrallel lines, terminating in a curve, and biſſected by a diameter. The half of theſe, is properly the ſemi-ordinate, though commonly called ordinate. See CURVE, PARABOLA, HYPERBOLA, &c.

ORDINATION, the act of conferring holy orders, or of initiating a perſon into the prieſthood by prayer, and the laying on of hands. Ordination has always been eſteemed the principal prerogative of biſhops, and they ſtill retain the function as a mark of ſpiritual ſovereignty in their dioceſe. Without ordination, no perſon can receive any benefice, parſonage vicarage, &c. A clerk muſt be twenty three years of age before he can have any ſhare in the miniſtry; and twenty four, before he can be ordained, and by that means be permitted to adminiſter the ſacraments. A biſhop on the ordination of clergymen, is to examine them in the preſence of the miniſters who aſſiſt him at the impoſition of hands; and in caſe any crime, as drunkenneſs, perjury, forgery, &c. be alledged againſt any one that is be ordained, either prieſt or deacon, the biſhop ought to deſiſt from ordaining him. The perſon to be ordained is to bring a teſtimonial of his life and doctrine to the biſhop, and give an account of his faith in Latin, and both prieſts and deacons are obliged to ſubſcribe the thirty-nine articles.

ORDNANCE, a general name for all ſorts of great guns, uſed in war. See the articles CANNON and GUN.

ORDONNANCE, in painting, is uſed for the diſpoſition of the parts of a picture, either with regard to the whole piece, or to the ſeveral parts; as the groups, maſſes, contraſts, &c.

ORDONNANCE, in architecture, is the compoſition of a building, and the diſpoſition of is parts, both with regard to the whole, and to one another; or, as Mr. Evelyn expreſſes it, determining the meaſure of what is aſſigned to the ſeveral apartments.

ORE, in natural hiſtory, the compound mineral glebe, earth, ſtone, or other ſubſtance; which is rich enough in metallic particles, to be worth the while of being purified; and by this means to ſeparate the metal from it, whether gold, ſilver, copper, iron, tin, &c. See METAL, Gold, &c.

ORGAL, among dyers, denotes the lees of wine dried. See DYEING.

ORGAN, οργανον, in general, is an inſtrument, or machine, deſigned for the production of ſome certain action or operation; in which ſenſe, the mechanic powers, machines, and even the veins, arteries, nerves, muſcles, and bones of the human body, may be called organs. See the articles POWER, MACHINE, VEIN, ARTERY, &c.

ORGAN, in muſic, the largeſt and moſt harmonious wind-inſtrument.

The invention of the organ is very antient, tho' it is agreed that it was very little uſed till the eighth century. It ſeems to have been borrowed from the Greeks. Vitruvius deſcribes an hydraulic one in his tenth book of architecture.

Hydraulic ORGAN, denotes a muſical machine that plays by means of water inſtead of wind.

Of theſe there are ſeveral in Italy, in the grottoes of vineyards.

ORGASM, *Orgaſmus*, an extacy, or impetuous deſire of coition, occaſioned by a turgeſency of the ſeminal veſſels.

Certain female animals have an orgaſm at particular ſeaſons of the year.

ORGUES, in the military art, are thick, long, pieces of wood, pointed at one end, and ſhod with iron, clear one of another; hanging each by a particular rope, or cord, over the gate-way of a ſtrong place, perpendicularly, to be let fall in caſe of an enemy.

Their diſpoſition is ſuch, that they ſtop the paſſage of the gate, and are preferrable to herſes and portculliſes; becauſe they may be either broke by a petard, or they may be ſtopped in their falling down; but a petard is uſeleſs againſt an orgue, for if it break one or two of the pieces, they immediately fall down again, and fill up the vacancy; or if they ſtop one or two of the pieces from falling, it is no hindrance to the reſt.

ORGUES, is alſo uſed for a machine, compoſed of ſeveral harquebuſs or muſquet-barrels, bound together, by means whereof ſeveral exploſions are made at the ſame time, uſed to defend breaches and other places attacked.

ORICHALCUM, or AURICHALCUM, braſs. See BRASS.

ORIENT, *Oriens*, in geography and aſtronomy, the eaſt, or eaſt point of the horizon; thus called, becauſe it is the place where the ſun riſes.

Hence, the equinoxial orient is uſed for that point of the horizon wherein the ſun riſes, when he is in the equator, or when he enters the ſigns of Aries and Libra; æſtival orient, is the point wherein the ſun riſes in the middle of ſummer, when the the days are longeſt; and the hybernal orient, the point where the ſun riſes in the middle of winter, when the days are ſhorteſt.

ORIENTAL, ſomething ſituated towards the eaſt with regard to us, in oppoſition to occidental. See OCCIDENTAL.

ORIFICE, the mouth, or aperture of a tube, pipe, or other cavity.

It is alſo uſed for the aperture of a wound, or ulcer. See WOUND and ULCER.

ORIGENISTS, in church hiſtory, a Chriſtian ſect in the fourth century, ſo called from their drawing their opinions from the writings of Origen.

The Origeniſts maintained, that the ſouls of men had a pre-exiſtent ſtate, that they were holy inteligences, and had ſinned in heaven before the body was created; that Chriſt is only the ſon of God by adoption, that he has been ſucceſſively united with all the angelical natures, and has been a cherub, a ſeraph, and all the celeſtial virtues, one after another; that in future ages, he will be crucified for the ſalvation of the devils, as he has already been for that of men, and that their puniſhment, and that of the damned, will continue only for a certain limited time.

ORIGINAL, a firſt draught or deſign of any thing, which ſerves as a model to be imitated or copied.

ORIGINAL SIN, the crime of eating the forbidden fruit, of which it is ſaid, all mankind are guilty at their conception by the imputation of Adam's tranſgreſſion; which is accounted for by ſuppoſing that Adam, as he was to be the father, was alſo the fœderal head, and repreſentative of the whole human race; and that on his ſinning, all that were to ſpring from him partook of his crime.

ORILLON, in fortification, is a ſmall rounding of earth faced with a wall; raiſed on the ſhoulder of thoſe baſtions that have caſemates, to cover the cannon in the retired flank, and prevent their being diſmounted by the enemy.

ORION, in aſtronomy, one of the conſtellations of the ſouthern hemiſphere.

The word is formed from the Greek ȣρειν, to make water; the antients ſuppoſing that it raiſed tempeſts at its riſing and ſetting.

The ſtars in the conſtellation Orion, in Ptolemy's catalogue are 37, in Tycho's 62, in the Britannic catalogue 80. The names, ſituations, magnitudes, longitudes, and latitudes of which are as follow:

Names and ſituations of the ſtars.	Signs.	Longitude.	Latitude South.	Magn.
		° ′ ″	° ′ ″	
Preced. and 6th in the lion's ſkin	II	7.28.29	15.25.30	4
5th in the lion's ſkin		7.56 24	13.31.20	4
7th in the lion's ſkin		7 41.50	16.48.55	4
1ſt and north. in the lion's ſkin		9. 5. 5	8.16. 7	4 5
3d in the lion's ſkin		9.18. 1	11. 9.17	6
5.				
4th in the lion's ſkin		9.10.47	12.24. 1	4
8th in the lion's ſkin		8. 5.26	20. 2.56	4
2d in the lion's ſkin		9.56.24	9. 6.31	4 5
Laſt and ſouth. in the lion's ſkin		9. 7.32	20.53.51	4 5
Preced. of 2 infor. towards the horn of Tau.		12. 7.50	7.25. 6	5
10.				
North. in the preced. arm		12.16.35	14.22.37	6
South. and ſubſeq. in the arm		12.36. 1	13. 4.	6
Subſ. of the infor. towards the horn of Tau.		13.23.27	7.21.32	5
That againſt the preced. ſide		13. 9.38	20. 7.24	4 5
That againſt the preced. arm		14.32.14	11.45.55	6
15.				
Bright one in preced. foot called regel		12.25.50	30.10.11	1
More north. over the heel		13.26.16	29.52.52	4
		14.42.32	20.30. 1	6
North. in the preced. ſide under the girdle		15. 9.36	23.31.19	5
Preced. and north. in the ſide		15.44.32	19.37.39	6
20.				
In the preced. ſhoulder		16.33 23	16.51.30	2
Preced. and ſouth. in the back		16. 8.16	21.21. 7	5
South. in the preced. ſide under the girdle		15.51.13	24. 5.24	6
In the hilt of the ſword		15.45.37	25.34.47	3
In the calf of the preced. leg		15. 9.37	30.57.44	5
25.				
Preced. of 4 in the back, as it were in a right line		16.46.40	20. 8.18	5
		17.19.12	24.21.29	6
That foll. the ſhoulder to the ſouth.		17.58.40	17.20.29	5
2d of four in the back		17.57.	20. 9	6
Preced. in the girdle		17.57.28	23.36. 7	2
30.				
Under the point of the ſword		17.29.55	30.35.12	4
Preced. in the head		19.11.41	13.51.19	5
In the back the 3d		18.46.56	19.34.10	6
In the head the north. of three		19.18. 8	13.25. 2	4
South. and ſubſeq. of the head		19.42.18	14. 2.58	5
35.				
Preced. of the contig. in the middle of the ſword		18.34.48	28.43.24	3 4
Prec. of the north. of the contig. in the mid. of the ſword.		18.38. 1	28.10.17	5
Subſeq. in the middle of the ſword		18.36. 4	28.45. 2	4
South. in the ſword		18.35. 7	29.14.37	3 4
Laſt of the north. in the ſword		18.42.38	28.11.45	5
40.				
Middle of three in the girdle		19. 3.34	24.33.23	2
Laſt of four in the line of the back		20. 5.46	19.16. 3	5
That under the third of the girdle		19.41.31	25.58.47	4
Subſeq. under the point of the ſword		19.31.15	30.34.50	5
Third and laſt in the girdle		20.17.35	25.20.17	2
45.				
Preced. in the hind-ſide		20.53.24	21.56. 8	5
		22,28,27	16.59.55	6

Names and ſituations of the ſtars.	Signs.	Longitude.	Latitude South.	Magn.
		° ′ ″	° ′ ″	
In the hind-knee	♊	21.59.31	33. 7. 6	3
Preced. of two in the club		24.18.13	3.11.44	5
Latter of two in the hind-ſide		23.34.14	21.37.10	6
50.				
		24.25. 3	3.44. 1	6
Glittering ſtar in the hind-ſhoulder		24.20.50	16. 4.26	1
		25.10.	21.38.50	6
That following the ſide out of form		25.16.31	22.56. 4	6
Preced. of thoſe following the knee		25.19.22	33. 2. 4	6
55.				
		26.25. 3	3.47.31	5 6
In the lower part of the hind-arm		26.11.55	13.50. 1	4
Subſeq. in the club		26.31.57	3.20.37	5
		26.17.28	18. 1.56	6
Laſt of the two ſubſeq. of the knee		27. 7.57	34. 4.58	5 6
60.				
		26.54.50	19.19.18	6
Preced. in the ſouth. in □ of hind-hand		27.27. 7	8.42.16	4 5
		28.26.15	3.39.59	6
Preced. of the north. in the ſquare		28.30. 4	7.19.30	6
Laſt of the ſouth. in the ſame		28.29.51	9.14.49	4 5
65.				
		29. 8.	4.16. 2	6
Laſt of the north.		29.19.59	7.17.31	6
		29.30.39	10.53.13	6
North. in the hind-ulna		29.41. 2	11.10.30	6
		29.49.32	29.42. 5	4 5
70.				
South. in the hind-ulna		29.55.50	13.28.25	6
		1.52.37	18.45.41	4
		3.29. 3	28. 3. 5	5
		3.51.38	30.18.32	4
Informes foll. Orion between Gemini and Canis major		4. 5.30	18.23.14	4
75.				
		4. 5. 3	15.54.21	4
		5.58. 1	13.13.14	4
		7.44.41	14.56.15	5
		8.23. 1	22.32.58	4
	♋	15. 7.38	22.46.	4

ORION'S RING, in aſtronomy, a conſtellation more uſually called eridanus. See the article ERIDANUS.

ORIGANUM, *Origany*, or wild marjorum, in botany, a genus of plants, whoſe flowers are ringent, and collected in an imbricated ſpike; the tube of the corolla is cylindric and compreſſed; the upper lip is plane, obtuſe, erect, and emarginated; and the lower one is trifid: it hath four ſtamina, two of which are longer than the others: there is no pericarpium, but the cup, which is connivent, contains four ovate ſeeds.

The common origany, which grows wild in many parts of England, is diaphoretic and diuretic, and may be uſed in the manner of tea in the aſthma and a violent cough; the powder of the leaves and flowers, dried in the ſhade, is cephalic, and is a principal ingredient in the herb-ſnuff: it helps digeſtion, diſcuſſes wind, and is uſed externally in baths for the feet.

ORLE, ORLET, or ORLO, in architecture, a fillet under the ovolo or quarter-round of a capital. When it is at the top or bottom of the ſhaft, it is called cincture. See the article CINCTURE.

ORLE, in heraldry, an ordinary in form of a fillet draw round the ſhield, near the edge or extremity thereof, leaving the field vacant in the middle. Its breadth is but half that of the treſſure or bordure, which contains a ſixth part of the ſhield; and the orle, only a twelfth: beſides that the orle is its own breadth diſtant from the edge of the ſhield, whereas the bordure comes to the edge itſelf. The form of the orle is the ſame with that of the ſhield, whence it reſembles an eſcutcheon.

ORNAMENTS, in architecture, are uſed to ſignify all the ſculpture or carved-work, wherewith a piece of architecture is enriched.

ORNITHOGALUM, ſtar of Bethlehem, in botany, a genus of plants, whoſe flower conſiſts of ſix petals of a lanceolated figure, from the baſe to the middle, erect, but ſpreading upwards, and perſiſtent; it hath ſix ſtamina, which are ſhorter than the corolla: the fruit is a roundiſh, angulated, trilocular capſule, formed of three valves, and contains a number of roundiſh ſeeds.

The roots of ornithogalum are of the bulbous kind, and are eaſily propagated by off-ſets, in July or Auguſt. This genus includes the ſtellaris of Dillenius.

ORNITHOLOGY, that branch of zoology which treats of birds. See BIRD.

Linnæus, whoſe ornithology we have chiefly followed, arranges the whole claſs of birds under ſix orders, according to the different figures of their beaks, viz.

1. The accipitres, or birds with uncinated or hooked beaks.

2. The picæ, or birds that have convex and compreſſed beaks.

3. The anſeres, comprehending ſuch birds as have depreſſed, and dentated, or ſerrated beaks.

4. The ſcolopaces, or thoſe furniſhed with ſubcylindric and obtuſe beaks.

5. The gallinæ, or birds which have the beak of a conic form, but crooked, and the upper chap imbricated.

6. The paſſeres, or birds with conic and ſharp-pointed beaks.

In the deſcription of birds, the feet, wings, and tail, are chiefly attended to.

In moſt birds the toes are four in number, three ſtanding forwards, and one backwards: in ſome, two toes ſtand forwards, and two backwards: ſome feet, again, are palmated, or have the toes connected together by a membrane; and others, ſemi-palmated.

With regard to the wings, the long quill-feathers, are called by authors remiges, as ſerving to fly with; and the other feathers, placed over the reſt of the body, tectrices. The long feathers of the tail are called rectrices, as ſerving to ſteer the bird's courſe through the air.

As to the other terms made uſe of in the deſcription of birds, they are theſe: cera expreſſes the membrane or naked tunic, which ſurrounds and extends itſelf over more or leſs of the baſe of the beak; urrhopigium is the rump; and as to other terms, they will be found explained under their ſeveral heads.

ORNITHOPODIUM, or ORNITHOPUS, bird's-foot, in botany, a genus of plants producing papilionaceous flowers; the vexillum is cordated and intire; the alæ are ovate and erect, and almoſt as large as the vexillum; the carina is very ſmall and compreſſed: the fruit is a taper ſubulated pod, with ſeveral articulations, and containing in each joint a ſingle roundiſh ſeed.

The leaves of a ſpecies of this genus, are ſaid to be good for an hernia, and for breaking and expelling the ſtone of the kidneys or bladder.

OROBANCHE, broom-rape, in botany, a genus of plants, the corolla of which is monopetalous and ringent; and its fruit is an oblong capſule formed of two valves, and containing a great many minute ſeeds.

The leaves of this plant, dried, and reduced to a powder, afford great relief in extreme pains of the cholic; and its ſyrup is recommended againſt the hypochondriac affection.

OROBANCHOIDES, a plant called by Linnæus monotropa. See the article MONOTROPA.

OROBUS, bitter-vetch, in botany, a genus of plants producing papilionaceous flowers; the vexillum is heart-ſhaped; the alæ are oblong and connivent; the carina is bifid and aſcendent: the fruit is a long taper pod, ending in a point, having one cell, which contains a number of roundiſh ſeeds.

It agrees in virtues with ervum. See the article ERVUM.

ORONTIUM, in botany, a genus of plants, whoſe flower-cup is a cylindric ſpadix; the corolla is formed of ſix peltated, roundiſh, perſiſtent petals, with ſix ſhort ſword-ſhaped filaments, topped with oblong twin antheræ: the fruit is a thin follicule, containing a fungous roundiſh ſeed.

ORPELLO, in the glaſs-trade, calcined glaſs reduced to a black powder.

ORPHAN, a fatherleſs child, or minor; or one that is deprived both of father and mother.

ORPIMENT, *Auripigmentum*, in natural hiſtory, a foſſile ſubſtance uſually found in copper-mines, compoſed of thin flakes, like the talcs; which eaſily ſplit, and are flexible, and not elaſtic, ſoluble in oil, fuſible in a moderate fire, and yielding in burning an offenſive ſmell like garlic.

It is an excellent depilatory mixed with lime, and made into a paſte with water; and the painters are fond of it as a gold-colour.

ORPINE, *Anacampſeros*, in botany, a plant whoſe root is perennial, compoſed of ſeveral white fleſhy tubercles, from which ariſe ſeveral upright, round, ſucculent ſtalks, about two feet high, branching out at the top; the leaves are fleſhy, oval, oblong, of a blueiſh-green colour, and ſerrated on their edges near the extremity: the flowers are placed on the top of the ſtalks in a corymbus, they are roſaceous, and are either of a white or purple colour: their form and generative parts are like thoſe of ſedum. See the article SEDUM.

Orpine is accounted vulnerary and aſtringent, and is much recommended for its virtue in eaſing of pains; the leaves bruiſed and laid on the part, produce this effect, both in green-wounds and putrid ulcers; and if applied to corns, will in a ſhort time take them away.

ORPINE *of Imperatus.* See the article TELEPHIUM.

Leſſer ORPINE. See the article CRASSULA.

ORRACH, four kinds, in botany. See the articles ATRIPLEX, BLITUM, ATRAPHAXIS, and CHENOPODIUM.

ORRERY, a curious machine, or movement, for repreſenting the motions and appearances of the heavenly bodies. See plate LXXII. *fig.* 5.

The orrery, or planetarium, is fixed in a frame of ebony, contained by twelve vertical planes, on which are repreſented the twelve ſigns of the zodiac. The upper ſurface is flat, of poliſhed braſs, on whoſe outward circumference are ſcrewed in twelve braſs pillars, which ſupport a large flat ſilvered ring, marked 12, repreſenting the ecliptic, with ſeveral circles drawn upon it. The three innermoſt are divided into twelve parts for the ſigns of the zodiac, each of which is divided into thirty degrees, and among theſe degrees are graved in their proper places, the nodes, aphelia, and greateſt north and ſouth latitudes of the planets. Between the next two circles are the cardinal points. The next three circles have the months and days of the month, according to the new ſtile. Upon the braſs ſurface of the machine are graduated ſilver circles, which carry the planets (repreſented by ſilver balls) upon arbors or ſtems, that raiſe them up to the height of the plane of the ecliptic; and turning about the handle or winch of the orrery, all the planets move at their proportional diſtances from a little gilt ball in the middle, which repreſents the ſun; and perform their revolutions according to their periodical times. There are fixed indices of blued ſteel, which ſhew the longitudes of the planets, by pointing to the diviſions of the ſilvered rings or circles, as they move round. But as theſe circles, being concentric, give only the mean diſtances, the true orbits, according to their excentricities, are graved on the outſide of each circle, with the periodical times taken from the tables, to ſhew what the revolutions are, nearer than can be performed by any machine. The nodes and aphelia, with the places of the greateſt north and ſouth latitudes, are alſo marked on thoſe orbits.

In the middle of this large circle, deſigned to repreſent the ecliptic, is fixed a globe 1. to repreſent the ſun; next the ſun is a ſmall ball, 2, to repreſent Mercury; next to this is Venus, repreſented by a larger ball, 3; and, at a greater diſtance from the ſun, you ſee the earth, 4, repreſented by an ivory ball, ſurrounded, at ſome diſtance, by a ring, which expreſſes the orbit of the moon, making an angle with the circle that repreſents the ecliptic, and thereby ſhewing the inclination that they have to each other in the heavens, and alſo the line of the nodes. Within the ſame ring is another ivory ball, 5, with a black cap or caſe, to repreſent the moon; the cap is contrived always to cover that hemiſphere, which is turned from the ſun, and thereby diſtinguiſheth the enlightened part from the dark ſide, and, conſequently, her age: 6 repreſents Mars; 7 is Jupiter, attended with his ſatellites, or four moons; and 8, the outmoſt of all the planets, is Saturn, with his ring or belt, and five ſatellites or moons. All theſe are fixed upon ſmall ſtems, which ſeverally repreſent their axes, each of which hath its peculiar and proper inclination to the plane of that circle which repreſents the ecliptic. 9 is a dial-plate; 10, 10, 10, meridians; 11, the equator; 12, the ecliptic with its circles, already deſcribed; 13, 13, two keys, for locking and unlocking the diurnal and annual motions; and as to the arctic circle, tropic of cancer, and moveable horizon, they are named in the figure.

By means of the orrery, a great many perſons, who have not time to apply themſelves to the ſtudy of aſtronomy, and yet are deſirous to be acquainted with the celeſtial appearances, in a few days may get a competent knowledge of ſeveral phænomina, and eſpecially be cured of the common prejudices againſt the motion of the earth, and the copernican ſyſtem. See the article COPERNICAN.

But the principal uſe of the orrery is to render the theory of the earth and the moon eaſy and intelligible; and to evidence to our ſenſes how all theſe appearances happen, which depend on the annual or diurnal rotation of the earth, and the monthly revolutions of the moon: as the variety of ſeaſons, the viciſſitudes and various lengths of days and nights, the manner of ſolar and lunar eclipſes, the various phaſes of the moon, &c.

There have been various forms invented for this noble inſtrument, two of which have principally obtained, viz. the hemiſpherical orrery, and the whole ſphere: though the orrery at firſt was made without any ſphere, with only the ſun, the earth, and moon, revolving about it; but as this was too imperfect a ſtate, they ſoon began to inveſt it, ſome with a half ſphere, and others with a whole ſphere, to be an adequate repreſentation of the ſolar ſyſtem.

The hemiſpherical orrery, as that juſt deſcribed, has been made in greater numbers than any other, on account of their being made much cheaper and eaſier than thoſe in a ſphere of the ſame ſize; there being a vaſt difference between placing an hemiſphere on the box of an orrery, and diſpoſing an orrery in a large moveable ſphere. But the idea given us by the former, is very imperfect and unnatural in compariſon of the latter, and it is ſurpriſing to think how they ſhould have had ſo great a run!

An orrery, therefore, adapted to an armillary

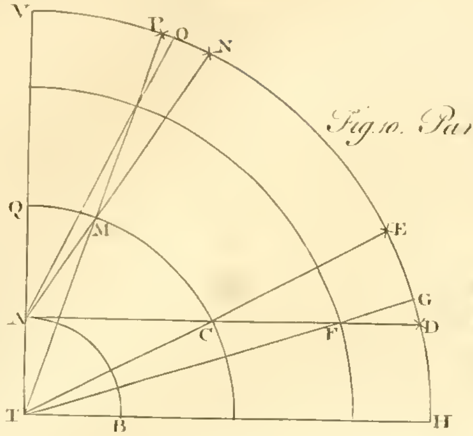


Fig.10. Parallax.

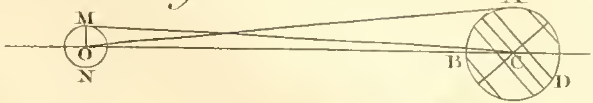


Fig.1.

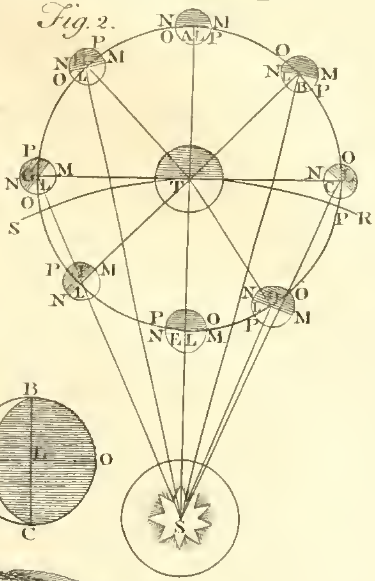


Fig.2.

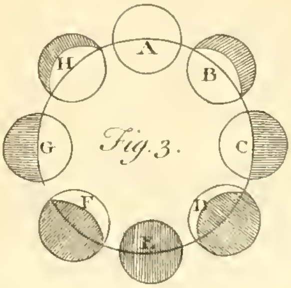


Fig.3.

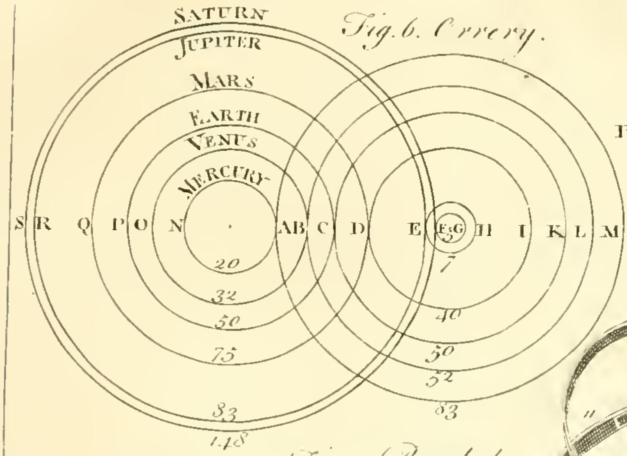


Fig.6. Orrery.

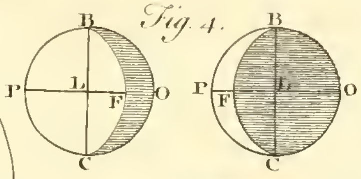


Fig.4.

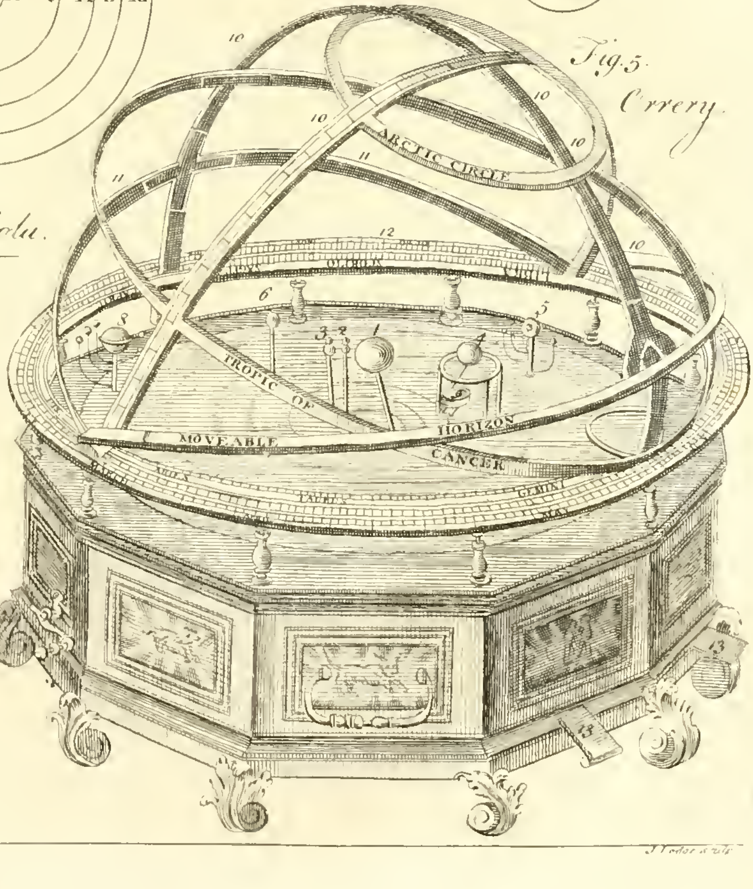


Fig.5. Orrery.

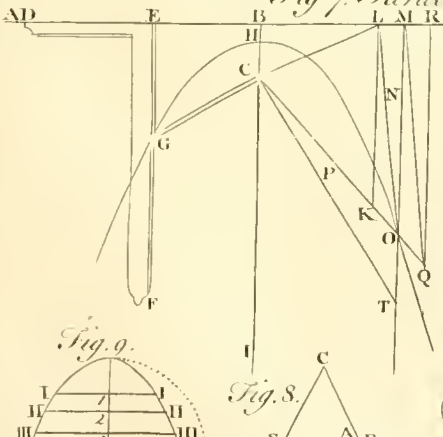


Fig 7. Parabola.

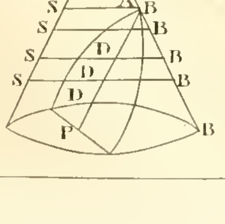


Fig.8.

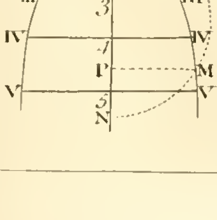


Fig.9.

J. Tedder sculp.

ſphere, is the only machine that can exhibit a juſt idea of the true ſyſtem of the world, with the diurnal and annual motions of the heavenly bodies; but is likewiſe capable of exhibiting the third motion of the earth, viz. that motion of the earth by which the poles of the world revolve about the poles of the ecliptic, and occaſions what is commonly called the preceſſions of the equinoxes, or more properly the retrogreſſion of the earth's nodes.

As the diſtances are in their true proportions to each other, ſo likewiſe are the bodies of the planets in their juſt proportions to one another. But it cannot be expected, that the diameters of the planets ſhould be in proportion to the diameters of the orbits; becauſe taking Jupiter under three inches diameter, and the earth a little more than a quarter of an inch, it would require the ſyſtem to be of the bigneſs of a mile and $\frac{3}{4}$, the orbit of Saturn 9000 feet in diameter, and ſo on of the reſt; which would make the machine 3000 times greater than it is. And if the bodies were ſuited to the dimenſions given, the bodies muſt be 3000 times leſs, which would render them all inviſible but the ſun; and that would be leſs than $\frac{1}{100}$th part of an inch. For this reaſon, as a ball big enough to repreſent the ſun cannot be put on, we are to ſuppoſe the ſun (in reſpect of them) as big as the inner circle of the ſilver ring which repreſents the ecliptic.

As the orbit of the moon, and the orbits of the ſatellites of Jupiter and Saturn, are quite loſt in this proportion of the orbits of the primary planets, much more are the ſatellites themſelves; therefore the ſatellites are uſually not put on in this poſition of the machine. But Saturn's ring is joined to Saturn's body, according to its proportion, and the inclination of its plane to the plane of Saturn's orbit: and as the planet is carried round, the ring always moves parallel to itſelf, as it does in the heavens. Thereby we ſee why the inhabitants of the earth, in one revolution of Saturn, ſee the ring twice in the moſt open ſituation of the anſæ, as at 8, and twice, as if it had no ring, that is, when the edge of the ring is towards the earth (the plane of the ring going through the obſerver's eye) and the ſucceſſive increaſing and decreaſing of the viſible bigneſs of the anſæ.

Jupiter, with his moons, is repreſented at 7, and the ſpots whereby his revolution has been obſerved.

When you have a complete idea of the proportional bigneſs of the planets, Jupiter and Saturn are taken off, and others put on three times leſs than the former, in order to put ſatellites about them, (and at the ſame time the moon is joined to the earth) and ſhew how the ſatellites accompany their primary planet in its courſe round the ſun. Theſe ſatellites which are pearls upon crooked ſtems, do not turn by clock-work round their primaries (as has been done in ſome large orreries) but are only ſet by the hand; becauſe, to do it, would be only a needleſs expence, to give a falſe notion of their bigneſs, diſtances, and inclination of their orbits, in reſpect of their primaries. But to give a right notion of Jupiter's and Saturn's ſatellites, there is ſhewn for each of theſe planets a ſyſtem a-part, where the diſtances from the primary, and the bigneſs of the ſatellites, are expreſſed; and in this ſyſtem, though Jupiter is but of about an inch diameter, the outermoſt ſatellite is as far diſtant from Jupiter's center, as Saturn is from the ſun in the machine; which ſhews the inconſiſtency and diſproportion of making the ſatellites to move round Jupiter in an orrery. Saturn's ſatellites are ſtill more improperly put in; becauſe four of them move in orbits very much inclined to Saturn's ecliptic (viz. in an angle of above thirty degrees) and the fifth has its orbit almoſt in the ſame plane as Saturn's ecliptic, with a diameter greater than the diameter of the whole orrery, even when Saturn is three times leſs than the Saturn of the orrery.

The next thing which is put on, is a contrivance to ſhew, that all the confuſion of the planets-motions in the Ptolemaic hypotheſis (called their ſtations and retrogradations) is not really, but apparently ſo, in the Capernican or true ſyſtem of the world. And this is done by two ſteel indices, one of which being always applied to the ſun, and ſucceſſively to the top of the ſtem of the planet to be examined, whilſt the other is applied to the earth (as a center) and the ſaid planet: by turning the handle of the machine, the heliocentric and geocentric places of the planet are ſeen on the ecliptic at the ſame time; ſhewing why the planets ſeem to go backwards and forwards when viewed from the earth; they go all the while regularly from eaſt to weſt, as they would be ſeen from the ſun.

When the machine is put in motion, all theſe bodies move round that which repreſents the ſun, and, at the ſame time, both that, and all thoſe which repreſent ſuch of the planets as have been obſerved to have a rotation round their axis, turn round upon the ſaid ſtems, and in their proper times. The ſatellites, or moons, alſo revolve about their primaries at the ſame time; and the ring that repreſents the orbit of the moon has likewiſe its proper motion, whereby that of its nodes is alſo expreſſed. The whole machine is put into motion by turning a ſmall winch, 14, like the key of a clock, with very little ſtrength. And, above this winch, is a cylindrical pin, which may be drawn a little out, or puſhed in at pleaſure: when it is puſhed in, all the planets, both primary and ſecondary, will move according to their reſpective periods, by turning the handle or winch: when it is drawn out, the motions of the ſatellites of Jupiter and Saturn will be ſtopped, while all the reſt move freely. In the place of the ſun, you may fix a braſs lamp, with two convex glaſſes, made on purpoſe; which, being placed with the glaſs directly to the earth, and turning round in the ſame time with the earth, throws a continual ſtrong light upon it and the moon, in whatever part of its orbit it is; and ſo not only the times in which the eclipſes of the ſun and moon will happen, are ſhewn, but the phænomena themſelves are truly repreſented.

When you propoſe to uſe this machine, place a ſmall black patch, or a bit of wafer, upon the middle of the ſun, right againſt the firſt degree of ♈: you may alſo place patches upon Venus, Mars, and Jupiter, right againſt ſome noted point in the ecliptic; put on the handle, and puſh in the pin which is juſt above it. One turn of this handle anſwers to a revolution of the ball, which repreſents the earth, about its axis; and, conſequently, to 24 hours of time, as may be ſeen by the motion of the hour index, 9, which is marked, and placed at the foot of the wire, on which the ball of the earth is fixed: again, when the index has moved the ſpace of ten hours, Jupiter makes one complete revolution round its axis; and ſo of the reſt.

By theſe means the revolutions of the planets, and their motions round their own axes, will be repreſented to the eye. And it is worth obſervation, that the diurnal motion of the planets was diſcovered, by obſerving the motions of the ſpots upon the ſurface of the ſun, and of the planets in the heavens, after the ſame manner as we here obſerve the motions of their repreſentatives, by that of the marks placed upon them in this machine.

This machine is ſo contrived, that the winch may be turned either way; ſo that, the ſame number of revolutions being made backwards, they will bring all the planets to their former aſpects or ſituations in reſpect to each other.

It would be too great an undertaking here to give an account of the mechaniſm of the larger ſort of orreries, which repreſented the movements of all the heavenly bodies; nor, indeed, can it be done either by diagram or diſcription, to render it intelligible to the moſt diſcerning reader; but, inſtead of that, we ſhall exhibit an idea of the theory and ſtructure of an uſeful, conciſe, and portable planetarium, which any gentleman may have made for a ſmall expence, and will exhibit, very juſtly, the motions of all the primary planets about the ſun, by wheel-work; and thoſe that have ſecondaries, or moons, may have them placed about their primaries moveable by the hand, ſo that the whole ſhall be a juſt repreſentation of the ſolar ſyſtem, or true ſtate of the heavens, for any given time of the year.

In order to this we muſt compare, and find out the proportion, which the periodical times, or revolutions of the primary planets, bear to that of the earth; and they are ſuch as are expreſſed in the table below, where the firſt column is the time of the earth's period in days and decimal parts; the ſecond that of the planets; the third and fourth are numbers in the ſame proportion to each other: as,

365,25 : 88 ☿ :: 83 : 20, for Mercury.
365,25 : 224,7 ♀ :: 52 : 32, for Venus.
365,25 : 686,9 ♂ :: 40 : 74, for Mars.
365,25 : 4332,5 ♃ :: 7 : 83, for Jupiter.
365,25 : 10759,3 ♄ :: 5 : 148, for Saturn.

If we now ſuppoſe a ſpindle or arbor with ſix wheels fixed upon it in an horizontal poſition, having the number of teeth in each, correſponding to the numbers in the third column, viz. the wheel A M (*fig.* 6.) of 83 teeth, B L of 52, C K of 50, (for the earth), D I of 40, E H of 7, and F G of 5; and another ſet of wheels moving freely about an arbor, having the number of teeth in the fourth column, viz. A N of 20, B O of 32, C P of 50, (for the earth), D Q of 75, E R of 83, and F S of 148; then if theſe two arbors of fixed and moveable wheels are made of the ſize, and fixed at the diſtance from each other, as here repreſented in the ſcheme, the teeth of the former will take thoſe of the latter, and turn them very freely, when the machine is in motion.

Theſe arbors, with their wheels, are to be placed in a box, of an adequate ſize, in a perpendicular poſition: the arbor of fixed wheels to move in pivots at the top and bottom of the box; and the arbor of moveable wheels to go through the top of the box, to a proper height, on the top of which is to be placed a round ball, gilt with gold, to repreſent the ſun. On each of the moveable wheels is to be fixed a ſocket, or tube, aſcending above the top of the box, and having on the top a wire fixed, and bent at a proper diſtance into a right angle upwards, bearing on the top a ſmall round ball, repreſenting its proper planets.

If then on the lower part of the arbor of fixed wheels be placed a pinion of ſcrew-teeth, a winch turning a ſpindle with an endleſs ſcrew, playing in the teeth of the arbor, will turn it with all its wheels; and thoſe wheels will move the others about with their planets, in their proper and reſpective periods of time, very exactly. For, while the fixed wheel C K moves its equal C P once round, the wheel A M will move A N a little more than four times round, and ſo will nicely exhibit the motion of Mercury; and the wheel F G will turn the wheel F S about $\frac{1}{29,5}$ round, and ſo will truly repreſent the motion of Saturn; and the ſame is to be obſerved of all the reſt.

ORRICE, the iris-root. See the article IRIS.

ORTEGIA, in botany, a genus of plants, whoſe flower is apetalous; it conſiſts of a pentaphyllous upright cup, which is premanent, with three ſubulated filaments, topped with linear, compreſſed

-preſſed antheræ. The fruit is a three-cornered, ovate, unilocular capſule, containing a great number of very minute ſeeds.

ORTEIL, in fortification, the ſame with berme. See the article BERME.

ORTHODOX, in church-hiſtory, an appellation given to thoſe who are found in all the articles of the Chriſtian faith.

ORTHOGONAL, in geometry, the ſame with rectangular.

ORTHOGRAPHIC *Projection of the Sphere*, that wherein the eye is ſuppoſed at an infinite diſtance; ſo called becauſe the perpendiculars from any point of the ſphere, will all fall in the common interſection of the ſphere with the plane of the projection. See PROJECTION and MAP.

ORTHOGRAPHY, that part of grammar, which teaches the nature and affections of letters, and the juſt method of ſpelling or writing words with all the proper and neceſſary letters, making one of the four greateſt diviſions or branches of grammar.

ORTHOGRAPHY, in geometry, the art of drawing or delineating the fore-right plan of any object, and of expreſſing the heights or elevations of each part. It is called orthography, from its determining things by perpendicular lines falling on the geometrical plane.

ORTHOGRAPHY, in architecture, the elevation of a building.

This orthography is either external or internal. The external orthography is taken for the delineation of an external face or front of a building; or, as it is by others defined, the model, platform, and delineation of the front of a houſe, that is contrived, and to be built, by the rules of geometry, according to which pattern the whole fabric is erected and finiſhed. This delineation or platform exhibits the principal wall, with its apertures, roof, ornaments, and every thing viſible to an eye placed before the building. Internal orthography, which is alſo called a ſection, is a delineation or draught of a building, ſuch as it would appear were the external wall removed.

ORTHOGRAPHY, in perſpective, is the fore-right ſide of any plane, i. e. the ſide or plane that lies parallel to a ſtraight line, that may be imagined to paſs through the outward convex points of the eyes, continued to a convenient length.

Lamy, and others, uſe the word ſcenography in the ſame ſenſe.

ORTHOGRAPHY, in fortification, is the profile or repreſentation of a work; or a draught ſo conducted, as that the length, breadth, height, and thickneſs of the ſeveral parts are expreſſed, ſuch as they would appear if perpendicularly cut from top to bottom. See FORTIFICATION.

ORTHOPNOEA, in medicine, a ſpecies or degree of aſthma, where there is ſuch a difficulty of reſpiration, that the patient is obliged to ſit or ſtand upright, to be able to breathe. See the article ASTHMA.

ORTIVE, in aſtronomy, the ſame with eaſtern: the ortive or eaſtern amplitude, is an arch of the horizon intercepted between where a ſtar riſes, and the eaſt point of the horizon, or point where the horizon and equator interſect.

ORVALA, in botany, a genus of plants, whoſe flower is monopetalous and ringent; the tube is the length of the cup; the upper lip is oblong, fornicated, and dentated on the top, and the lower one is cut into three ſegments: there is no pericarpium, but the cup contains four reniform ſeeds.

ORYZA, rice, in botany, a genus of plants, of which there is but one known ſpecies: it hath a root like that of wheat; the ſtalks are furrowed, riſing to two or three feet high, and jointed; the leaves are lanceolated and fleſhy; the flowers grow on the tops of the ſtalks in panicles, they are of a purple colour, and are each formed of a bivalvular glume, with two obtuſe premanent valves for its corolla; the nectarium is compoſed of two leaves, plane, very ſmall, and placed on the ſide of the germen; there is no pericarpium; the corolla grows to the ſeed, which is large, oblong, and compreſſed.

This plant is much cultivated in hot countries, in moiſt, marſhy land, and is uſed inſtead of bread in moſt of the eaſtern countries, where it is the principal food. It is now planted in great abundance in Carolina, and is as good as in any other part of the world. It is chiefly uſed here for puddings, and to make rice-milk.

OSCILLATION, in mechanics, the vibration, or reciprocal aſcent and deſcent of a pendulum. See PENDULUM.

OSIER, in botany, a ſpecies of the ſalix or willow, much cultivated in moiſt places, called oſier-grounds, for the uſe of baſket-makers; no plant being more pliant for their purpoſe: they are propagated by cuttings, and are annually cut down, and always kept low: the ſeaſon for planting the cuttings is in February, and for cutting the twigs in winter.

OSMITES, in botany, a genus of plants, producing compound and radiated flowers: the flowers which compoſe the diſc are hermaphrodite, tubuloſe, and quinquifid; the female flowers which form the rays, are lanceolated and intire; it hath no pericarpium, but the cup, which is immutable, contains ſolitary oblong ſeeds with very little down.

OSMUNDA, flowering fern, in botany, a genus of the cryptogamia claſs of plants; it produces on the top of the leaves a globoſe capſule, diſpoſed in a racemus, and opens horizontally: the ſeeds are numerous, very ſmall, and of an oval figure: It grows in moiſt places in ſeveral parts of England; the root is the only part uſed in medicine, and is ſaid to be detergent and ſub-aſtringent.

OSSICLE, *oſſiculum*, a little bone, a diminutive of bone, in which ſenſe it is frequently uſed by anatomiſts.

Botaniſts alſo uſe oſſiculum for the ſtone of a plumb, cherry, or any other ſtone-fruit.

OSSIFICATION, the formation of bones, but more particularly the converſion of parts naturally ſoft, to the hardneſs and conſiſtence of bones.

OSTEOCOPOS, in medicine, any pain in the bones, whether ariſing from wearineſs, a ſharp ſcorbutic humour, or a venereal taint. See the article PAIN.

OSTEOSPERMUM, in botany, a genus of plants, producing compound, radiated flowers; the corollulæ, which form the diſc, are hermaphrodite, tubuloſe, and quinquedented: the female florets, which compoſe the rays, are linear, ligulated, and tridentated; the hermaphrodite flowers are barren, the ſeeds are hard, globoſe and ſolitary, and placed in the cup.

OSTIA, in anatomy, an appellation given to the orifices or apertures of the veſſels of the body.

OSTRACISM, *οϛρακιϛμος*, in Grecian antiquity, denotes the baniſhment of ſuch perſons whoſe merit and influence gave umbrage to the people of Athens, leſt they ſhould attempt any thing againſt the public liberty. It was ſo called, becauſe the people voted a perſon's baniſhment, by writing his name on ſhells, called in greek *οϛρακον*, and caſting them into an urn.

OSTREA, the oyſter. See the article OYSTER.

OSTRICH, *Struthio*, in ornithology, a diſtinct genus of birds, of the order of the gallinæ: it has only two toes to each foot, and theſe are both placed forward; and its head is ſimple, or not ornamented with the appendages which are common to moſt birds of this order.

The oſtrich is the talleſt of all the bird kind, meaſuring ſeven or eight feet when it ſtands erect: its legs are very long and naked; and the ſtructure of the foot, having only two toes, is particular.

OSYRIS, poet's roſemary, in botany, a genus of plants, producing male and female apetalous flowers on different plants. The fruit is an umbilicated, globoſe berry, with one cell, containing an oſſeous round ſeed.

OTHONNA, African ragwort, in botany, a genus of plants, producing compound, radiated flowers: the hermaphrodite florets, which compoſe the diſc, are tubulous and quinquedentated; the female corollulæ, which form the rays, are lanceolate, ligulate, indented at the extremity in three parts, which are reflexed. The ſeeds, which are ſolitary and oblong, are contained in the cup, and are either naked, or crowned with down.

OTIS, the buſtard, in ornithology, makes a diſtinct genus of birds, of the order of the gallinæ, the characters of which are theſe: there are three toes on each foot, all turned forewards; and the head is naked, or has no comb.

The buſtard has been confounded with the turkey: it is about the ſize of the common peacock, and runs at a prodigious rate, being frequently taken with greyhounds in a fair courſe, in the manner of hunting the hare: its fleſh is well taſted.

OTTER, *Lutra*, in zoology, a genus of quadrupeds, of the order of the feræ, the characters of which are theſe: the foreteeth of the upper-jaw are ſtraight, diſtinct, and acute; thoſe of the under jaw are obtuſe, and ſtand cloſe together. the ears are ſituated lower than the eyes, and the feet are furniſhed each with five toes, and are palmated or formed for ſwimming.

Of this genus there are are two ſpecies: 1. The common otter, with all the toes of an equal length: this is a very fierce animal, three feet in length, including the tail. 2. The Braſilian otter, with the inner toe ſhorter than all the reſt. This is ſomewhat larger than the former ſpecies.

OVAL, an oblong, curvilinear figure, otherwiſe called ellipſis. See ELLIPSIS. However, the proper oval, or egg ſhape, differs conſiderably from that of the ellipſis, being an irregular figure, narrower at one end that at the other: whereas the ellipſis, or mathematical oval, is equally broad at each end: though, it muſt be owned, theſe two are commonly confounded together; even geometricians calling the oval a falſe ellipſis.

OVARIES, in anatomy, called, by the earlier writers, teſtes muliebres, are two bodies of nearly an oval figure; but gibbous on the upper ſurface, and flat below: they are of a whitiſh colour and ſmooth ſurface, and are annexed, one on each ſide, to the fundus of the womb.

OVATION, in the Roman antiquity, a leſſer triumph, allowed to commanders for victories won without the effuſion of much blood; or, for defeating a mean and inconſiderable enemy. The ſhow generally began at the Albanian mountain, whence the general, with his retinue, made his entry into the city on foot, with many flutes or pipes ſounding in concert as he paſſed along, and wearing a garland of myrtle as a token of peace. The term ovation, according to Servius, is derived from *ovis*, ſheep, becauſe on this occaſion the conqueror ſacrificed a ſheep, as in a triumph he ſacrificed a bull.

OVEN, a kind of domeſtic furnace, uſed for baking bread, pies, tarts, &c. of a circular ſtructure, with a very low roof, well lined, both on the top, bottom, and ſides, with ſtone; it has a ſmall entrance in the front, which is exactly fitted by a kind of door, which being clapped to the mouth of the oven, confines the heat, while bread, pies, or puddings are baking. Over this, paſtry-cooks, &c. have another oven built much in the ſame manner, which is uſed for ſuch things as require a leſs degree of heat.

Aſſaying Oven, in metallurgy, a particular kind of furnace, uſed by aſſayers in their operations upon metals.

OVER, in general, ſignifies one thing being above another; through, or from, one end to another; beyond, croſs, or overthwart; it alſo denotes exceſs, &c. thus,

Over-blow, among ſeamen, is when the winds blow ſo very hard, that the ſhip can bear no topſails.

Over-done, in the manege: a horſe is ſaid to be over-done when his wind and ſtrength are broke and exhauſted with fatigue.

Over-flowing *of Lands*, among huſbandmen, is commonly effected by diverting the ſtreams of rivers, brooks, land-floods, or ſprings, or ſome part of them, out of their natural channel; but where ſtreams lie too low for this, they are made uſe of to turn ſuch engines as may raiſe a quantity of water to do it. The moſt uſeful engine for this purpoſe is the Perſian wheel. See the article Persian Wheel.

Over-hale, in the ſea-language. A rope is ſaid to be over-haled, when drawn too ſtiff, or haled the contrary way.

Over-ruling *an Objection*, in law, is the rejecting it, or ſetting it aſide by the court.

Over-running, among printers. See the article Printing.

OVERSEERS *of the Poor*, are public officers appointed by ſtatute in every pariſh, to provide for the poor therein; and ſometimes there are two, three, or four, according to the largeneſs of pariſhes.

OVERSET, or Overthrow, in the ſea-language. A ſhip is ſaid to overſet, when her keel turns uppermoſt; which misfortune is occaſioned either by bearing too much ſail, or by grounding her ſo that ſhe falls upon one ſide.

OVERT, the ſame with open: thus an overt-act ſignifies an act which, in law, muſt be clearly proved; and ſuch is to be alledged in every indictment for high treaſon.

OVERTURE, or Ouverture, opening or preluding; a term uſed for the ſolemnities at the beginning of a public act or ceremony; an opera, tragedy, concert of muſic, &c.

The overture of the theatre, or ſcene, is a piece of muſic uſually ending with a fugue; the overture of a jubilee is a general proceſſion, &c.

OVIEDA, in botany, a genus of plants, the corolla whereof is a ringent ſingle petal; the tube of the corolla is very long and ſmall; the upper-lip is concave and emarginated; the lower one is divided into three equal ſegments. The fruit is a globoſe berry, containing two roundiſh ſeeds.

OVIPAROUS, a term applied to ſuch animals as bring forth their young, *ab ovo*, from eggs; as birds, inſects, &c. See the article Egg.

OVIS, the ſheep, in zoology. See the article Sheep.

OUNCE, *Uncia*, a little weight, the ſixteenth part of a pound-avoirdupois, and the twelfth part of a pound-troy: the ounce-avoirdupois is divided into eight drams, and the ounce-troy into twenty penny-weights. See Weight.

OVOLO, or Ovum, in architecture, a round moulding, whoſe profile, or ſweep, in the Ionic and Compoſite capitals, is uſually a quadrant of a circle: whence it is alſo commonly called the quarter-round. It was uſually enriched with ſculpture by the ancients, in the form of cheſnut-ſhells; whence Vitruvius, and others, called it echinus, i. e. cheſnut-ſhell. See the article Moulding.

Among us, it is uſually cut with the repreſentation of eggs and anchors, or arrow-heads placed alternately.

OUT-HOUSES are ſuch as belong and are adjoining to dwelling-houſes.

OUT-LAND, among the Saxons, was that land that lay beyond the demeſnes, and was granted out to tenants; though at the will of the lord, in like manner as copyhold eſtates.

OUT-LAW, ſignifies one that is deprived of the benefit of the law, and therefore held to be out of the king's protection.

OUTLAWRY, is where a perſon is outlawed, and on that account loſes the benefit of a ſubject.

OUTLICKER, in a ſhip, a ſmall piece of timber made faſt to the top of the poop, and ſtanding out right a-ſtern. At the outmoſt end thereof is a hole, into which the ſtanding part of the ſheet is reeved, through the block of the ſheet; and then again through another block, which is ſeized cloſe by the end of this outlicker. It is ſeldom uſed in great ſhips, except the mizen-maſt is placed ſo far aft, that there is not room within-board to hale the ſheet flat.

OUTWARD *Flanking-Angle*, or *The Angle of the Tenaille*, in fortification, is comprehended by the two flanking lines of defence. See the article Tenaille.

OUTWORKS, in fortification, all thoſe works made without-ſide the ditch of a fortified place, to cover and defend it.

Outworks, called alſo advanced and detached works, are thoſe which not only ſerve to cover the body of the place, but alſo to keep the enemy at a diſtance, and prevent his taking advantage of the cavities and elevations uſually found in the places about the counterſcarp, which might ſerve them either as lodgments, or as rideaux, to facilitate the carrying on their trenches, and planting their batteries againſt the place; ſuch are ravelines, tenailles, horn-works, queve d'arondes, envelopes, crown-works, &c. See the articles Raveline, Tenaille, &c.

OWLER, any perſon who conveys wool, &c. to the ſea-ſide in the night-time, there to be ſhipped, cuntrary to law.

OWSE, among tanners, oaken bark beaten or ground ſmall, to ſerve in the preparation of leather.

OX, *Bos*, in zoology, makes a genus of quadrupeds. See the article Bos.

OXALIS, wood-ſorrel, in botany, a genus of plants, whoſe flower is monopetalous, and deeply cut into five obtuſe emarginated ſegments, cohering together by their ungues; the ſtamina are ten capillary erect filaments, topped with roundiſh furrowed antheræ. The fruit is a pentagonal capſule, with five cells, containing roundiſh ſeeds, which fly out with an elaſticity when ripe.

OX-EYE, buphthalmum, in botany. See the article Buphthalmum.

OXGANG, or Oxgate, is generally taken, in our old law-books, for fifteen acres, or as much ground as a ſingle ox can plough in a year.

OXICOCCUS, in botany, a ſpecies of vaccinium. See Vaccinium.

OXYCRATE, *Oxycratum*, in pharmacy, &c. a mixture of vinegar and water, proper to aſſwage, cool, and refreſh: they make fomentations of oxycrate, clyſters of oxycrate, &c. The uſual proportion is one ſpoonful of vinegar to five or ſix ſpoonfuls of water.

OXYCROCEUM, in pharmacy, &c. a preparation much uſed in plaſters for fractures, &c. made as follows: take yellow wax, one pound; pitch and galbanum, each half a pound: melt them over a gentle fire; and then add of Venice-turpentine, myrrh, and olibanum, each three ounces; ſaffron, two ounces: make them into a plaſter.

OXYMEL, in pharmacy, a compoſition of vinegar and honey.

There are ſeveral ſorts of oxymel, whereof the ſimple kind is made by boiling, in a glazed earthen-veſſel, and with a gentle fire, two pounds of clarified honey, in a pint of vinegar, to the conſiſtence of a ſyrup.

The chief compound oxymels, are oxymel of of garlic, and oxymel of ſquills.

Oxymel of garlic is made thus: take of garlic, ſliced, an ounce and an half; caraway-ſeeds, and ſweet-fennel-ſeeds, of each two drams; of clarified honey, ten ounces; of vinegar, half a pint; boil the vinegar a little while in a glazed earthen veſſel, with the ſeeds bruiſed; then add the garlic, and cover the veſſel: after all is cold, preſs out the liquor; and, with the heat of a balneum, diſſolve in it the honey.

Oxymel of ſquills is made by boiling three pounds of clarified honey in a quart of vinegar of ſquills, over a gentle fire, to the conſiſtence of a ſyrup.

In all the oxymels, a metalline veſſel muſt be avoided, leſt it ſhould be corroded by the vinegar.

OYER, in law-books, ſeems to have been antiently uſed for what is now called aſſiſes. See the article Assise.

Oyer *and Terminer*, a commiſſion directed to the judge of aſſiſe, and other gentlemen, impowering them to hear and determine all criminal cauſes, and to try all offenders, whether for treaſon, felony, or treſpaſs.

Oyer *of a Deed*, a petition to hear and peruſe any deed, upon which an action is brought.

OYES, or Oyez, ſignifies *hear ye*; and is frequently uſed by the cryers in our courts, on making proclamation, or to enjoin ſilence.

OYSTER, or Oister, *Oſtrea*, in ichthyology, a genus of bivalve ſhell-fiſh, the lower valve of which is hollowed on the inſide, and gibboſe without; the upper one is more flat; and both are compoſed of a multitude of laminæ or cruſts, and uſually ſcabrous or rough on the outer ſurface: ſome oyſter-ſhells are alſo furniſhed with tubercles or ſpines, and others are deeply furrowed and plicated: the figure of moſt is roundiſh, but in ſome it is quite irregular.

Oyſter-ſhells are accounted drying and abſtergent, and, given internally, ſudorific.

P.

P, The fifteenth letter, and eleventh conſonant of our alphabet; the ſound of which is formed by expreſſing the breath ſomewhat more ſuddenly than in forming the ſound of b: in other reſpects, theſe two ſounds are very much alike, and are often confounded one with another.

When *p* ſtands before *t* or *ſ*, its ſound is loſt, as in the words *pſalms*, *pſychology*, *ptolemaic*, *ptiſan*, &c. when placed before *h*, they both together have the ſound of *f*, as in *philoſophy*, *phyſic*, &c.

As an abbreviature, P. ſtands for publius, pondo, &c. PA. DIG. for patricia dignitas; P. C. for patres conſcripti; P. F. for publii filius; P. P. for propoſitum, or propoſitum publice; P. R. for populus Romanus; PR. S. for prætoris ſententia; and PRS. P. for præſes provinciæ.

In the Italian muſic, P. ſtands for piano, or ſoftly; PP. for piu piano, or more ſoftly; and PPP. for pianiſſimo, or very ſoftly.

Among aſtronomers, P. M. is uſed to denote poſt meridiem, or afternoon; and ſometimes for poſt mane, or after midnight.

As a numeral, P. ſignifies the ſame as $\overline{G}$, viz. 400; and with a daſh over it, thus $\overline{P}$, 400,000.

Among phyſicians, P. denotes pugil, or the eighth part of a handful; P. Æ. partes æquales, or equal parts of the ingredients; P. P. ſignifies pulvis Patrum, or the Jeſuits-powder; and ppt. præparatus, prepared.

PABULUM, fuel, among natural philoſophers and chemiſts. See the articles FUEL and FIRE.

PACE, *Paſſus*, a meaſure taken from the ſpace between the two feet of a man, in walking; uſually reckoned two feet and a half, and in ſome men, a yard, or three feet. See MEASURE.

The geometrical pace is five feet; and 60000 ſuch paces make one degree of the equator. See DEGREE.

PACK, in commerce, denotes a quantity of goods, made up in loads, or bales, for carriage.

A pack of wool is ſeventeen ſtone and two pounds, or a horſe's load.

PACKAGE, is a ſmall duty of one penny in the pound, paid for all goods not particularly rated.

PACKERS, perſons whoſe employment it is to pack up all goods intended for exportation; which they do for the great trading companies and merchants of London, and are anſwerable if the goods receive any damage through bad packing.

PACT, or PACTION, *Pactum*, in law, denotes a contract or agreement between two or more perties. See CONTRACT.

PACTA CONVENTA, in Poland, are the articles agreed on between the king and the republic, which they mutually oblige each other to obſerve.

PADDLE, in glaſs-making, an inſtrument with which the workmen ſtir about the ſand and aſhes in the calcar. See the articles CALCAR and GLASS.

PADDOC, or PADDOC-COURSE, a piece of ground encompaſſed with pales or a wall, and taken out of a park for exhibiting races with grey-hounds, for plates, wagers, or the like.

PADUS, the bird-cherry, in botany, a genus of plants, whoſe flower conſiſts of five roundiſh, concave, patent petals, inſerted by their ungues into the edge of the calyx: the fruit is a roundiſh drupe, incloſing an oval acuminated nut, with rough furrows.

Of this genus, the laurel is a ſpecies. See the article LAUREL.

The fruit of this plant is recommended to be hung about the neck of children ſubject to epilepſies. It is of an emollient and heating nature.

PÆAN, among the ancient pagans, was a ſong of rejoicing ſung in honour of Apollo, chiefly uſed on occaſions of victory and triumph.

PÆDEROTA, in botany, a genus of plants, whoſe flower is monopetalous, ſubrotated, quadrifid, and obtuſe: the ſtamina are two ſlender filaments, topped with connivent antheræ: the fruit is an ovate capſule, with two cells, opening at the top, and contains a number of roundiſh ſeeds.

PÆDO-Baptism, infant-baptiſm, or that conferred on children. See Baptism.

PÆONIA, piony, in botany, a genus of plants, whoſe flower conſiſts of five large, roundiſh, concave petals, which ſpread open, and are narrow towards the baſe: the filaments are numerous, and topped with oblong quadrangular antheræ: the fruit conſiſts of two oblong, reflexed, hairy capſules, each containing a ſingle cell and one valve, opening longitudinally inwards: the ſeeds are numerous, oval, ſmooth, ſhining, and coloured: the number of the germina (though naturally two) varies greatly, for in ſome flowers there are five, but there are always the ſame number of capſules as germina.

The double flowering piony, is kept in our gardens, for the beauty of its large red flowers; they are eaſily propagated by parting their roots, in Auguſt or September, and are extremely hardy, for they will grow in any ſoil or ſituation.

A ſpecies, called the male piony, is principally uſed in medicine, and is ſaid to be a ſpecific againſt the falling-ſickneſs, convulſions, and the palſy.

PAGAN, *Paganus*, a heathen, gentile, or idolator; one who adores falſe gods. See the article Paganism.

PAGANALIA, certain feſtivals obſerved by the ancient Romans, in the month of January.

They were inſtituted by Servius Tullius, who appointed a certain number of villages (pagi) in each of which an altar was to be raiſed for annual ſacrifices to their tutelar gods; at which all the inhabitants were to aſſiſt, and give preſents in money, according to their ſex and age, by which means the number of country-people was known.

The ſervants upon this occaſion offered cakes to Ceres and Tellus, to obtain plentiful harveſts.

PAGANISM, the religious worſhip and diſcipline of Pagans, or the adoration of idols and falſe gods. See Idolatry.

The gods of paganiſm were either men, as Jupiter, Hercules, Bacchus, &c. or fictitious perſons, as Victory, Fame, Fever, &c. or beaſts, as in Egypt, Crocodiles, Cats, &c. or, finally, inanimate things, as Onions, Fire, Water, &c.

PAGE, a youth of ſtate retained in the family of a prince or great perſonage, as an honourable ſervant, to attend in viſits of ceremony, do meſſages, bear up trains, robes, &c, and at the ſame time to have a genteel education, and learn his exerciſes.

The pages in the king's houſhold are various, and have various offices aſſigned them, as pages of honour, pages of the preſence-chamber, pages of the back ſtairs, &c.

This word is uſed in the Turkiſh ſeraglio for the children of tribute, or ſlaves who wait on the grand ſeignior: they are commanded by the chief aga, and conſtitute four claſſes, called oda's.

PAGEANT, a triumphal car, chariot, arch, or other like pompous decoration, variouſly adorned with colours, flags, &c. carried about in public ſhews, proceſſions, &c.

PAGOD, or Pagoda, a name whereby the Eaſt-Indians call their temple in which they worſhip their gods.

Pagod, or Pagoda, is alſo the name of a gold and ſilver coin, current in ſeveral parts of the Eaſt-Indies.

PAIN, *Dolor*, is defined to be an uneaſy ſenſation, ariſing from a ſudden and violent ſolution of the continuity, or ſome other accident, in the nerves, membranes, muſcles, veſſels, &c. of the body; or, according to ſome, it conſiſts in a motion in the organs of ſenſe; and according to others, it is an emotion of the ſoul occaſioned by theſe organs.

PAINTED-Lady, pink, in botany. See the article Pink.

Painted Lady, pea, in botany. See the article Lathyrus.

PAINTING, the art of repreſenting natural bodies, and giving them an appearance of life, by the turn of lines, and the degrees of colours.

Whoever would apply himſelf to painting, ſays that celebrated Italian painter Leonardo da Vinci, muſt in the firſt place learn perſpective; this will enable him to diſpoſe things in their proper places, and to give the due dimenſions to each: having done this, he muſt learn to deſign; chooſing for that purpoſe ſome able maſter, who at the ſame time may give him ſome inſight into the colours of figures: he ought then to conſult nature, to confirm himſelf in what he has already learnt, and, laſtly, let him apply himſelf to the ſtudy and imitation of the greateſt maſters, in order to get a habit of reducing what he has learnt into practice. See the articles Drawing, Design, Perspective, &c.

For the different methods of painting, ſee the articles Enamel, Fresco, Glass, Limning, Miniature, &c.

PAIR, *Par*, denotes two equal and ſimilar things joined together, either collectively, as a pair of gloves, or two ſimilar parts that compoſe one whole, or a ſet of things joined to make another complete, &c.

Pair, in anatomy, an aſſemblage or conjugation of two nerves, which have their origin together in the brain, or ſpinal marrow, and thence diſtributed into the ſeveral parts of the body, the one on one ſide, and the other on the other.

PALACE, *Palatium*, a name generally given to the dwelling-houſes of kings, princes, and other great perſonages; and taking different epithets, according to the quality of the inhabitants, as imperial palace, royal palace, pontifical palace, cardinal palace, ducal palace, epiſcopal palace, &c.

PALANQUIN, a kind of chaiſe, or chair, borne by men on their ſhoulders, much uſed by the people of China, and the eaſt, as a vehicle for their eaſy conveyance from place to place.

PALATE, *Palatum*, in anatomy, the fleſh that compoſes the roof, or the upper and inner part of the mouth. See MOUTH.

PALE, *Palus*, a little pointed ſtake or piece of wood, uſed in making incloſures, ſeparations, &c.

The pale was an inſtrument of puniſhment and execution, among the ancient Romans, and ſtill continues ſo among the Turks. Hence, empaling, the paſſing a ſharp pale up the fundament through the body.

PALE, in heraldry, one of the honourable ordinaries of an eſcutcheon; being the repreſentation of a pale, or ſtake, placed upright, and comprehending the whole height of the coat from the top of the chief to the point.

PALED FLOWERS, in botany, are thoſe which have their leaves ſet about, or ſurrounding, a head or thrum, as in marigolds, &c.

PALES, or PILES, in carpentry, denote rows of ſtakes driven deep into the ground to make wooden bridges over rivers; they ſerve to ſupport the beams laid acroſs them, from one row to another, and are ſtrongly bound with croſs pieces.

PALILICIUM, in aſtronomy, the ſtar called the bull's-eye, or aldebaran. See the article ALDEBARAN.

PALING, a ſort of fenſing for fruit-trees planted in fields, wherein three ſmall poſts are erected at a foot and a half diſtance one from another, and near the top nailed to each other with croſs-bars.

In fixing the pales in form of a triangle, room is to be left for the tree to play and bow by the high winds, without galling: the trees are to be bound to a ſtake for a year or two, after which, fern or ſtraw may be ſtuffed in betwixt the tree and the uppermoſt rails to keep it upright.

If the place be open to deer, rabbits, or the like, a poſt is to be nailed to the bar between every two pales.

PALISADE, or PALISADO, in fortification, an incloſure of ſtakes or piles driven into the ground, each ſix or ſeven inches ſquare, and eight feet long, three whereof are hid under-ground.

Turning-PALISADES, an invention of M. Coehorn, in order to preſerve the paliſades of the parapet of the covert-way from the beſiegers ſhot.

He orders them ſo, that as many of them as ſtand in the length of a rod, or in about ten feet, turn up and down like traps, ſo as not to be in ſight of the enemy till they juſt bring on their attack, and yet are always ready to do the proper ſervice of paliſades.

PALISADE, in gardening, denotes a ſort of ornament; being a row of trees which bear branches and leaves from the bottom, cut and ſpread in manner of a wall along the ſide of an alley, or the like' ſo as to appear like a wall covered with leaves.

PALISSE', in heraldry, a bearing like a range of paliſades before a fortification, repreſented on a feſſe, riſing up a conſiderable height, and pointed at top, with the field appearing between them.

PALIURUS, Chriſt's-thorn, in botany, a plant which grows naturally in Paleſtine; it riſes with a pliant ſhrubby ſtalk, to the height of eight or ten feet, ſending out many weak ſlender branches, armed with thorns, garniſhed with oval leaves placed alternately, ſtanding upon foot-ſtalks near an inch long, theſe have three longitudinal veins, and are of a pale green; the flowers come out at the wings of the ſtalk in cluſters, almoſt the length of the young branches; they are of a greeniſh-yellow colour, and appear in June; they are ſucceeded by broad, roundiſh, buckler-ſhaped ſeed-veſſels, which have borders like the brim of a hat, the foot-ſtalks being faſtened to the middle; theſe have three cells, containing in each a ſingle ſeed.

This is by many perſons ſuppoſed to be the plant from which the crown of thorns, put upon the head of our Saviour, was compoſed; the truth of which is ſupported by many travellers of credit, who affirm, that this is one of the moſt common ſhrubs in the country of Judea; and from the pliableneſs of its branches, which may be eaſily wrought into any figure, it may afford a probability.

This ſhrub alſo grows wild in moſt parts of the Levant, alſo in Italy, Spain, Portugal, and the ſouth of France; it is propagated by ſowing its ſeeds, or by laying down its tender branches in the ſpring, which will take root in a year's time.

For the generical characters of paliurus, ſee the article RHAMNUS, of which it is held a ſpecies by Linnæus.

PALL, in heraldry, denotes a kind of croſs, repreſenting the pallium, or archiepiſcopal ornament ſent from Rome to the Metropolitans.

PALL, *Pallium*, in matters of dreſs. See the article PALLIUM.

PALLADIUM, in antiquity, a ſtatue of the goddeſs Pallas, ſuppoſed to have dropped down from heaven, preſerved in Troy, whereon the fate of that city is ſaid to have depended.

PALLET, among painters, a little oval table or piece of wood, or ivory, very thin and ſmooth; on, and round which, the painters place the ſeveral colours they have occaſion for, to be ready for the pencil.

The middle ſerves to mix the colours on, and to make the tints required in the work. It has no handle, but inſtead thereof, a hole at one end to put the thumb through to hold it.

PALLET, among potters, crucible-makers, &c. a wooden inſtrument, almoſt the only one they uſe, for forming, beating, and rounding their works: they have ſeveral kinds, the largeſt are oval, with a handle; others are round, or hollowed triangularly; others, in fine, are in manner of large knives, ſerving to cut off whatever is ſuperfluous on the moulds of their work.

Pallet, in gilding, an inſtrument made of a ſquirrel's tail, to take up the gold-leaves from the pillow, and to apply and extend them on the matter to be gilt.

Pallet, in heraldry, is nothing but a ſmall pale, conſiſting of one half of it in breadth, and therefore there are ſometimes ſeveral of them upon one ſhield.

Pallet is alſo a part belonging to the ballance of a watch or movement. See Watch.

PALLIATION, or a Palliative Cure, in medicine, is when, in deſperate and incurable diſeaſes, after predicting the fatal event, the phyſician preſcribes ſome remedies for mitigating the pain, or ſome other urgent ſymptoms, as in ulcerated cancers, or cancerous fiſtulas, and the like.

Palliative indication, is where the ſymptoms of a diſeaſe give too much trouble and danger to have their cure deferred till the diſeaſe whereon they depend is removed: here the ſymptoms themſelves are to be cured or mitigated apart.

PALLIER, or Paillier, in building, denotes a landing-place in a ſtair-caſe.

PALLIFICATION, the ſtrengthening the foundation of any building, by driving piles into the ground. See the articles Pile and Foundation.

PALLIUM, or Pall, an archiepiſcopal veſtment, of white woollen cloth, about the breadth of a border, made round, and thrown over the ſhoulders.

Upon this border there are two others of the ſame matter and form, one of which falls down upon the breaſt, and the other upon the back, each having a red croſs upon it; ſeveral croſſes of the ſame colour being likewiſe upon the upper part of it, about the ſhoulders.

PALM, *Palma*, in anatomy, the inſide of the hand, called alſo vola. See the articles Hand and Palmaris.

Palm is alſo a meaſure of length. See the article Measure.

Palm-Sunday, in the Chriſtian church, the Sunday next before Eaſter; being ſo called in memory of our Saviour's triumphal entry into Jeruſalem, when the multitude that attended him ſtrewed palm-branches in his way.

Palm-Tree, phœnix, in botany, &c. See the article Phoenix,.

PALMA Christi, in botany. See the article Riccinus.

PALMARIS Musculus, one of the flexor-muſcles of the hand, ſo called as being inſerted into the palm of the hand by a broad expanded tendon: its office ſeems to be the conſtriction of the palm. There is alſo another muſcle of the hand called palmaris brevis, and quadratus, in form of a ſmall maſs of fleſh, which adheres to the aponeuroſis of the former muſcle, above the abductor muſcle of the little finger: it is ſaid to aſſiſt in drawiug together the hand; but Heiſter obſerves, that both theſe muſcles are found wanting in diſſections.

PALMATED, ſomething reſembling the ſhape of the hand: thus we ſay palmated leaves, roots, ſtones, &c.

PALMETTO, in botany. See the article Chamærops.

PALMIPEDES, among ornithologiſts, the ſame with web-footed birds.

PALMISTRY, a kind of divination, or rather a deceitful art practiſed by gypſies, who pretend to foretel future events by looking upon the lines and marks of the hand: it is prohibited by ſtat. 1 and 2 Phil. and Mar. c. 4.

PALPABLE, ſomething perceivable by the ſenſes, particularly that of feeling.

PALPITATION, in medicine, a ſpaſtic contraction of the heart, when it leaps and beats violently.

PALSY, παραλυσις, in medicine, a diſeaſe wherein the body, or ſome of its members, loſe their motion, and ſometimes their ſenſation or feeling.

This diſeaſe never is acute, is often tedious, and in old people almoſt incurable; and the patient for the moſt part drags a miſerable life. For the vigour of his mind, together with his memory, are loſt, or vaſtly impaired; he totters and ſhakes, and becomes a diſmal ſight; as if no longer a man, but an animal half dead.

PALUMBERIUS, accipiter, the goſhawk. See the article Goshawk.

PALUMBUS, the ringdove, a beautiful ſpecies of pigeon, with the neck white on each ſide, and a brown ſpot behind. ſee the article Colomba.

PALUS Meotis. See Meotis.

PALY, or Palé, in heraldry, is when the ſhield is divided into four or more equal parts, by perpendicular lines falling from the top to the bottom.

Paly-Bendy is when the eſcutcheon is divided by perpendicular lines, which is paly; and alſo by diagonals, which is called bendy.

PANACEA, among phyſicians, denotes an univerſal medicine, or a remedy for all diſeaſes; a thing impoſſible to be obtained, according to no leſs an author than Boerhaave.

Some alſo give the appellation panacea to certain plants, called in Engliſh alheals. See the article Alheal.

PANADA, a diet conſiſting of bread boiled in water to the conſiſtence of a pulp, and ſweetened with a little ſugar. It is given to young children, and to ſick perſons, whoſe digeſtion is weak, or where ſtronger foods would be improper. It is ſometimes made thin, to ſerve as a drink.

PANAX, *Ginſeng*, in botany. See the article GINSENG.

PANCHYMAGOGUE, in pharmacy, a name given to ſome cathartic extracts, that have the reputation of purging off all kinds of humours.

PANCRATIUM, in botany, a genus of plants; the characters of its flowers are; the cup is an oblong, obtuſe, compreſſed ſpatha, opening on the ſide, and withers; the corolla conſiſts of ſix lanceolated petals, and a cylindrical, funnel-ſhaped nectarium, on the outſide of which, above the baſe, the petals are inſerted: the ſtamina are ſix ſubulated filaments, inſerted in the brim of the nectarium, and topped with oblong proſtrate antheræ; the germen is obtuſe and trigonal; the ſtyle ſlender, and longer than the ſtamina, and crowned with an obtuſe ſtigma. The fruit is a roundiſh three-cornered capſule, formed of three valves, having three cells, which contain a number of globoſe ſeeds.

There are ſeveral ſpecies of the pancratium, which are all bulbous rooted; the moſt eſteemed are the Weſt-Indian kinds; the flowers are large, growing in bunches on the top of the ſtalks; they are of a pure white, and have a moſt delightful fragrancy. Theſe plants require a hot-houſe to preſerve them, and are increaſed by the off-ſets which ariſe from the root.

PANCREAS, in anatomy, popularly called the ſweet-bread, is a large gland, of a flattiſh ſhape and fleſhy colour, extended behind the ſtomach, and reaching from the duodenum tranſverſely towards the ſpleen. Its length is eight or nine inches; its breadth about two fingers, or two and a half; its thickneſs about one finger; and its weight about three ounces. In man, the ſhape of a pancreas very much reſembles the tongue of a dog; it is broadeſt towards the duodenum, and gradually narrower towards the ſpleen. Its ſubſtance is glandulous, and it ſeems formed by a conglomeration of many glands. It is ſurrounded with a membrane, which is contiguous with the peritonæum: it has arteries from the cœliac and ramus ſplenicus; and veins alſo from the ſplenic vein; its nerves are from the par vagum and the intercoſtals; and, finally, it has an excretory duct, which is ſituated in the middle of the pancreas, where it reſembles an empty vein, and is about the thickneſs of a ſmall ſtraw. This duct terminates in the duodenum, which it enters obliquely, four or five fingers-breadth below the pylorus, uſually at the ſame orifice with the ductus cholidocus; but ſometimes it has a double aperture.

The uſe of the pancreas is to ſecrete a peculiar liquor, called the pancreatic juice, which is of a ſalivoſe nature, and is carried by the pancreatic duct into the duodenum, where it ſerves to dilute the chyle, to render it more fluid, and fit to enter the mouths of the lacteals; and, perhaps, to temper and dilute the bile, to change its viſcidity, bitterneſs, colour, &c. and make it mix with the chyle, in order to reduce the ſeveral taſtes, odours, and properties of the ſeveral foods, into one homogeneous one.

PANDECTS, in the civil law, collections made by Juſtinian's order, of five hundred and thirty-four deciſions of the ancient lawyers, on ſo many queſtions occurring in the civil law; to which that emperor gave the force and authority of law, by an epiſtle prefixed to them. The pandects conſiſted of fifty books, and make the firſt part of the body of the civil law.

PANEGYRIC, on oration in praiſe of ſome extraordinary thing, perſon, or virtue.

Panegyrics were anciently made in the public and ſolemn aſſemblies of the Greeks, either at their games, their feaſts, or religious meetings. To render them the more ſolemn, they uſed to begin with the praiſes of the deity, in whoſe honour the games, &c. were celebrated; then they deſcended to the praiſes of the people or country where they were celebrated; then to the princes or magiſtrates who preſided at them; and at length to the champions, eſpecially thoſe who had gained the prize.

Panegyric is ranked among the demonſtrative kinds of orations, whereof there are commonly reckoned two kinds, viz. the artificial, where every thing is reduced to certain heads; and the other natural, where the order of hiſtory is obſerved.

PANEL, in law, ſignifies a ſchedule, or ſmall roll of parchment, in which is contained the names of the jurors returned by the ſheriff, to paſs upon trial; ſo that the impanelling of a jury, is no more than the ſheriff's entering them upon his panel or roll.

PANIC, denotes an ill-grounded terror or fright.

PANICLE, in botany, denotes a ſoft woolly beard, on which the ſeeds of ſome plants, as millet, reeds, &c. hang.

PANICUM, panic, in botany, a genus of plants, the corolla of which is compoſed of two oval, acute, pointed valves: the ſtamina are three ſhort hairy filaments, topped with oblong antheræ: the ſeed is ſingle and roundiſh, and incloſed in the corolla.

Panic is cultivated in ſeveral parts of Germany, France, and Italy, as corn, for the ſuſtenance of the inhabitants, of which they make cakes or bread; but its nutriment is not reckoned ſo good as millet.

Panic-ſeed is accounted drying, refrigerant, and aſtringent; and therefore recommended in ſpitting of blood, and nocturnal pollutions.

PANNEL, in joinery, is a tympanum, or ſquare piece of thin wood, ſometimes carved, framed, or grooved in a larger piece, between two upright pieces and two croſs pieces.

PANNEL, in maſonry, is one of the faces of a hewn ſtone.

PANNELS *of a Saddle*, are two cuſhions or bolſters, filled with cow's, deer's, or horſe's hair, and placed under the ſaddle, on each ſide, to prevent the bows and bands from galling the horſe.

PANNICULUS CARNOSUS, in comparative anatomy, a robuſt fleſhy tunic, ſituated in beaſts, between the tunic and the fat; by means of which, they can move their ſkin in whole or part: it is altogether wanting in mankind.

PANTALOON, a ſort of garment, conſiſting of breeches and ſtockings all of one piece; ſaid to have been firſt introduced by the Venetians.

In a theatrical ſenſe, pantaloon denotes a buffoon, who performs groteſque dances; and hence is uſed, by ſome, for the habit or dreſs worn by ſuch perſons.

PANTHEA, in antiquity, ſtatues compoſed of the figures or ſymbols of ſeveral divinities.

PANTHEON, in Roman antiquity, a temple of a circular form, dedicated to all the gods: it was built by Agrippa, ſon-in-law to Auguſtus; but is now converted into a church, and dedicated to the Virgin and all the martyrs.

PANTHER, *Panthera*, in zoology, the female leopard. See LEOPARD.

PANTOMIME, in antiquity, a perſon who imitates all ſorts of actions and characters, by mere geſtures, without ſpeaking a word.

PAPAVER, the poppy, in botany. See the article POPPY.

PAPAW, *Carica*, in botany, a genus of the dioecia claſs, producing male and female flowers on different plants; the male flower is monopetalous and infundibuliform, with the limb cut into five parts; the corolla of the female flower is pentapetalous, the petals being lanceolato-linear, obtuſe on both ſides, very long, erect below the middle, but above the middle bending outwards and downwards. The fruit is a very large, oblong, fleſhy berry, angulated with five furrows, having five cells containing a number of ſmall, ovate, furrowed ſeeds, incloſed in a pulp.

The papaw riſes with a thick, ſoft, herbaceous ſtem, to the height of eighteen or twenty feet, which is naked till within two or three feet of the top, and hath marks of the veſtages of the fallen leaves great part of its length. The leaves come out on every ſide of the ſtem, upon long footſtalks; thoſe which are ſituated undermoſt are almoſt horizontal, but thoſe on the top are erect; theſe leaves are very large, and divide into many lobes, which are deeply ſinuated or cut into irregular diviſions: the whole plant abounds with a milky acrid juice, which is eſteemed good for the ring-worm. The ſtem of the plant, and alſo the footſtalks of the leaves, are hollow in the middle; the flowers of the male plants are produced from between the leaves on the upper part of the plant on every ſide; they have footſtalks near two feet long, at the ends of which the flowers ſtand in looſe cluſters, each having a ſeparate ſhort footſtalk, theſe are of a pure white, and have an agreeable odour. The flowers of the female papaw alſo come out between the leaves toward the upper part of the plant upon very ſhort footſtalks, ſitting cloſe to the ſtem. The fruit is about the ſize of a common melon, and are of different forms; ſome are angular, and compreſſed at both ends, others are oval or globular, and ſome pyramidal; the fruit alſo abounds with the ſame acrid milky juice as the plants. This fruit, when ripe, is by the inhabitants of the Caribbee iſlands eaten with pepper and ſugar, as melons.

Theſe plants are raiſed from ſeeds, but being tender, they require a hot-houſe to preſerve them in this climate.

PAPER, ϖαπυρος, ſheets of a thin matter, made of ſome vegetable ſubſtance.

The materials on which mankind have, in different ages, contrived to write their ſentiments, have been extremely various; in the early ages they made uſe of ſtones, and tables of wood, wax, ivory, &c. See the article BOOK.

Paper, with regard to the manner of making it, and the materials employed therein, is reducible to ſeveral kinds; as Egyptian paper, made of the ruſh papyrus; bark paper, made of the inner rind of ſeveral trees; cotton-paper; incombuſtible paper; and the European paper, made of linen rags.

Linen, or European paper, appears to have been firſt introduced among us towards the beginning of the XIVth century; but by whom this valuable commodity was invented, is not known. The method of making paper of linen or hempen rags, is as follows: the linen-rags being carried to the mill, are firſt ſorted, then waſhed very clean in puncheons, whoſe ſides are grated with ſtrong wires, and the bottoms bored full of holes. After this they are fermented, by laying them in heaps, cloſe covered with ſacking, till they ſweat and rot; which is commonly done in four or five days. When duly fermented, they are twiſted into handfuls cut ſmall, and thrown into oval mortars, made of well-ſeaſoned oak, about half a yard deep, with an iron-plate at bottom, an inch thick, eight inches broad, and thirty long: in the middle is a waſhing-block, grooved, with five holes in it, and a piece of hair-ſieve faſtened on the inſide: this keeps the hammers from touching it, and prevents any thing going out except the foul water. Theſe mortars are continually ſupplied with water, by little troughs, from a ciſtern, fed by buckets fixed to the ſeveral floats of a great wheel, which raiſes the wooden hammers, for pounding the rags in the mortars. When the rags are beaten to a certain degree, called the firſt ſtuff, the pulp is removed into boxes, made like corn-chandlers bins, with the bottom board aſlant, and a little ſeparation on the front, for the water to drain away. The pulp of the rags being in, they take away as many of the front-boards as are needful, and preſs the maſs down hard with their hands: the next day they put on another board, and add more pulp, till the box is full: and here it remains mellowing a week, more or leſs, according to the weather. After this, the ſtuff is again put into clean mortars, and is beaten a-freſh, and removed into boxes, as before; in which ſtate it is called the ſecond ſtuff. The maſs is beat a third time, till ſome of it being mixed with fair water, and brewed to and fro, appears like flour and water, without any lumps in it; it is then fit for the pit-mortar, where it is perfectly diſſolved, and is then carried to the vat, to be formed into ſheets of paper.

But lately, inſtead of pounding the rags to a pulp with large hammers, as above, they make uſe of an engine, which performs the work in much leſs time. This engine conſiſts of a round ſolid piece of wood, into which are faſtened ſeveral long pieces of ſteel, ground very ſharp. This is placed in a large trough with the rags, and a ſufficient quantity of water. At the bottom of the trough is a plate with ſteel bars, ground ſharp like the former; and the engine being carried round with prodigious velocity, reduces the rags to a pulp in a very ſhort time. It muſt be obſerved, that the motion of the engine cauſes the water in the trough to circulate, and by that means, conſtantly returns the ſtuff to the engine. The trough is conſtantly fed with clean water at one end, while the dirty water from the rags is carried off at the other, through a hole, defended with wire gratings, in order to hinder the pulp from going off with the dirty water.

When the ſtuff is ſufficiently prepared as above, it is carried to the vat and mixed with a proper quantity of water, which they call priming the vat. The vat is rightly primed, when the liquor has ſuch a proportion of the pulp, as that the mould, on being dipped into it, will juſt take up enough to make a ſheet of paper of the thickneſs required. The mould is a kind of ſieve, exactly of the ſize of the paper to be made, and about an inch deep, the bottom being formed of fine braſs wire, guarded underneath with ſticks to prevent its bagging down, and to keep it horizontal; and further, to ſtrengthen the bottom, there are large wires placed in parallel lines, at equal diſtances, which form thoſe lines viſible in all white paper, when held up to the light; the mark of the paper is alſo made in this bottom, by interweaving a large wire in any particular form. This mould the maker dips into the liquor, and gives it a ſhake as he takes it out, to clear the water from the pulp. He then ſlides it along a groove to the cocher, who turns out the ſheet upon a felt, laid on a plank, and lays another felt on it, and returns the mould to the maker, who, by this time, has prepared a ſecond ſheet, in another mould: and thus they proceed, laying alternately a ſheet and a felt, till they have made ſix quires of paper, which is called a poſt; and this they do with ſuch ſwiftneſs, that, in many ſorts of paper, two men make twenty poſts, or more, in a day. A poſt of paper being made, either the maker or coucher whiſtles; on which four or five men advance, one of whom draws it under the preſs, and the reſt preſs it with great force, till all the water is ſqueezed from it; after which it is ſeparated, ſheet by ſheet, from the felts, and laid regularly one ſheet upon another; and having undergone a ſecond preſſing, it is hung up to dry. When ſufficiently dried, it is taken off the lines, rubbed ſmooth with the hands, and laid by till ſized, which is the next operation. For this they chooſe a fine temperate day, and having boiled a proper quantity of clean parchment or vellum-ſhavings, in water, till it comes to a ſize, they prepare a fine cloth on which they ſtrew a due proportion of white vitriol and roch-allum, finely powdered, and ſtrain the ſize through it, into a large tub; in which they dip as much paper at once as they can conveniently hold, and with a quick motion give every ſheet its ſhare of the ſize, which muſt be as hot as the hand can well bear it. After this, the paper is preſſed, hung up ſheet by ſheet to dry; and being taken down, is ſorted, and what is only fit for outſide-quires, laid by themſelves: it is then told into quires, which are folded and preſſed. The broken ſheets are commonly put together, and two of the worſt quires are placed on the outſide of every ream or bundle; and being tied up in wrappers, made of the ſettling of the vat, it is fit for ſale.

Paper is of various kinds, and uſed for various purpoſes: with regard to colour, it is chiefly diſtinguiſhed into white, blue, and brown; and with regard to its dimenſions, into atlas, elephant, imperial, ſuper-royal, royal, medium, demy, crown, fool's-cap, and pot-paper.

Blotting-PAPER, is paper not ſized, and into which, ink readily ſinks: it is uſed in books, &c. inſtead of ſand, to prevent blotting; and alſo by apothecaries for filtring.

Teint, or *Demi-Teint*-PAPER, is a paper uſed for deſigning on, and is either blue, brown, or biſtered.

Biſtered-PAPER, is white-paper waſhed over with a ſponge dipped in ſoot-water. Its uſe is to ſave the labour of the crayon, in places which are to be ſhadowed the ſame depth as the teint of this paper: as to the light places, they are made with chalk.

Marbled-PAPER. See MARBLING.

PAPIA, or ORVALA, in botany. See the article ORVALA.

PAPILIO, the butterfly, in zoology, a numerous genus of four-winged inſects, of the lepidoptera order, diſtinguiſhed by clavated antennæ.

The butterflies are ſo numerous, that authors commonly divide them into claſſes or ſubdiviſions, according to the number of their legs, ſome having ſix and others only four legs, under each of which are comprehended a multitude of beautiful ſpecies, diſtinguiſhed by the different colours and variegations of their wings.

PAPILIONACEOUS, among botaniſts, an appellation given to the flowers of certain plants, from their reſembling the figure of a butterfly with its wings expanded; they always conſiſt of four petals, the upper one is called the vexillum, or ſtandard; the two petals, which compoſe the ſides, are called the alæ, or wings; and the loweſt petal is termed the carina, or keel, which in ſome flowers is intire, and in others divided into two ſegments.

All plants bearing papilionaceous flowers, belong to the diadelphia claſs of Linnæus: ſuch are peas, beans, kidney-beans, vetches, and other legumes.

PAPILLA, the nipple of the breaſt, in anatomy, See BREAST.

There are alſo papillæ of the ſkin and tongue. See CUTIS and TONGUE.

PAPPUS, in botany, a ſoft downy ſubſtance, adhering to the upper part of the ſeeds of divers plants, as of thiſtles, hawkweeds, dandelion, &c. Its uſe is to ſpread them when ripe, by ſuſtaining them in the air ſo that they may be conveyed to a great diſtance.

PAPULÆ, a name uſed, by ſeveral authors, for eruptions on the ſkin of any ſort.

PAR, in commerce, ſignifies any two things equal in value; and in money-affairs, it is ſo much as a perſon muſt give of one kind of ſpecie, to render it juſt equivalent to a certain quantity of another.

In the exchange of money with foreign countries, the perſon to whom a bill is payable, is ſuppoſed to receive the ſame value as was paid the drawer by the remitter; but this was not always the caſe, with reſpect to the intrinſic value of the coins of different countries, which is owing to the fluctuation in the prices of exchange amongſt the ſeveral European countries, and the great trading cities.

The par, therefore, differs from the courſe of exchange in this, that the par of exchange ſhews what other nations ſhould allow in exchange, which is rendered certain and fixed, by the intrinſic value of the ſeveral ſpecies to be exchanged: but the courſe ſhews what they will allow in exchange; which is uncertain and contingent, ſometimes more and ſometimes leſs; and hence the exchange is ſometimes above and ſometimes under par. See the article EXCHANGE.

PARABLE, a fable, or allegorical inſtruction, founded on ſomething real or apparent in nature or hiſtory, from which a moral is drawn, by comparing it with ſomething in which the people are more immediately concerned: ſuch are the parables of Dives and Lazarus, of the Prodigal Son, of the Ten Virgins, &c.

Kircher derives the uſe of parables from the Egyptians. Some make a difference between a parable and a fable; but Grotius and others uſe the two terms promiſcuouſly.

Parables are certainly a moſt delicate way of expreſſing diſagreeable truths on the mind, and in many caſes have the advantage of a more open reproof, and even of formal leſſens of morality: thus Nathan made David ſenſible of his guilt by a parable; and thus our Saviour, in attacking the prejudices of his countrymen, always ſpoke to them in parables.

PARABOLA, in geometry, a figure ariſing from the ſection of a cone, when cut by a plane parrallel to one of its ſides. See the article CONIC SECTIONS.

To deſcribe a parabola in plano, draw a right line A B (plate LXXII. fig. 7.) and aſſume a point C without it; then in the ſame plane with this line and point, place a ſquare rule D E F, ſo that the ſide D E may be applied to the right line A B, and the other E F turned to the ſide on which the point C is ſituated. This done, and the thread F G C, exactly of the length of the ſide of the rule, E F, being fixt at one end to the extremity of the rule F, and at the other to the point C, if you ſlide the ſide of the rule D E along the right line A B, and by means of a pin, G, continually apply the thread to the ſide of the rule, E F, ſo as to keep it always ſtretched as the rule is moved along, the point of this pin will deſcribe a parabola G H O.

Definitions. 1. The right line A B is called the directrix. 2. The point C is the focus of the parabola. 3. All perpendiculars to the directrix, as L K, M O, &c. are called diameters; the points, where theſe cut the parabola, are called its vertices; the diameter B I, which paſſes through the focus C, is called the axis of the parabola; and its vertex, H, the principal vertex. 4. A right line terminated on each ſide by the parabola, and biſſected by a diameter, is called the ordinate applicate, or ſimply the ordinate to that diameter. 5. A line equal to four times the ſegment of any diameter, intercepted between the directrix and the vertex where it cuts the parabola, is called the latus rectum, or parameter of that diameter. 6. A right line which touches the parabola only in one point and being produced on each ſide falls without it, is a tangent to it in that point.

Carteſian PARABOLA, is a curve of the ſecond order, expreſſed by the equation $xy = ax^3 + bx^2 + c + xa$, containing four infinite legs, viz. two hyperbolic ones tending contrary ways, and two parabolic legs joining them, being the ſixty-ſixth ſpecies of lines of the third order according to Sir Iſaac Newton, called by him a trident.

Diverging PARABOLA, a name given by Sir Iſaac Newton to five different lines of the third order, expreſſed by the equation $yy = ax^3 + bx^2 + cx + d$.

PARABOLIC CONOID, in geometry, a ſolid generated by the rotation of a parabola about its axis: its ſolidity is $= \frac{1}{2}$ of that of its circumſcribing cylinder.

The circles conceived to be the elements of this figure are in arithmetical proportion, decreaſing towards the vertex.

A parabolic conoid is to a cylinder of the ſame baſe and height, as 1 to 2, and to a cone of the ſame baſe and height, as $1\frac{1}{2}$ to 1. See GAUGING.

PARABOLIC CUNEUS, a ſolid figure formed by multiplying all the D B's (plate LXXII. fig. 8) into the D S's; or which amounts to the ſame, on the baſe A P B erect a priſm, whoſe altitude is A S; this will be a parabolical cuneus, which of neceſſity will be equal to the parabolical pyramidoid, as the component rectanctles in one are ſeverally equal to all the component ſquares in the other.

PARABOLIC PYRAMIDOID, a ſolid figure generated by ſuppoſing all the ſquares of the ordinate applicates in the parabola ſo placed as that the axis ſhall paſs through all the centers at right angles; in which caſe the aggregate of the planes will form the parabolic pyramidoid.

The ſolidity hereof is had by multiplying the baſe by half the altitude, the reaſon of which is obvious; for the component planes being a ſeries of arithmetical proportionals beginning from 0, their ſum will be equal to the extremes multiplied by half the number of terms.

PARABOLIC SPACE, the area contained between any entire ordinate as V V (plate LXXII. fig. 9.) and the curve of the incumbent parabola.

The parabolic ſpace is to the rectangle of the ſemi-ordinate into the abſciſs, as 2 to 3; to a triangle inſcribed on the ordinate as a baſe, it is as 4 to 3.

Every parabolical and paraboloidical ſpace is to the rectangle of the ſemi-ordinate into the abſciſs, as $rxy\ (m + r)$ to xy; that is, as r to $m + r$.

Segment of a PARABOLIC SPACE, is that ſpace included between two ordinates.

PARABOLIC SPINDLE, in gauging; a caſk of the ſecond variety is called the middle fruſtum of a parabolic ſpindle.

The parabolic ſpindle is eight-fifteenths of its circumſcribing cylinder.

PARABOLOIDES, a name given to parabolas of the higher kind, which are algebraic curves.

PARACENTESIS, an operation in ſurgery commonly called tapping.

PARACENTRIC MOTION, in aſtronomy, denotes ſo much as a revolving planet approaches nearer to, or recedes from the ſun, or center of attraction.

PARACENTRIC *Solicitation of Gravity*, is much the ſame with the centrepetal force.

PARACLET, the COMFORTER, a name given to the Holy Ghoſt. See the article TRINITY.

PARADE, the placing any thing to public view, with all its advantages and ornaments.

PARADE, in war, is a place where the troops meet to go upon guard, or any other ſervice.

PARADE, in fencing, is the action of parrying or turning off any thruſt.

PARADISE, a term principally uſed for the garden of Eden, in which Adam and Eve were placed immediately upon their creation.

The celeſtial paradiſe is that place of pure and refined delight in which the ſouls of the bleſſed enjoy everlaſting happineſs.

Bird of PARADISE, *Paradiſæa*, in ornithology, a genus of birds of the order of the picæ, the beak of which is of a cultratoſubulated form, and acute; the forehead is gibbous, and the two middle feathers are extremely long, and very firm.

PARADOX, in philoſophy, a propoſition ſeemingly abſurd, as being contrary to ſome received opinion; but yet true in fact.

PARAGRAPH, in general, denotes a ſection or diviſion of a chapter, and in references is marked thus ¶.

PARALEPSIS, παραλειψις, in rhetoric, the pretence of paſſing over a thing, and yet mentioning it by the bye.

PARALLACTIC, in general, ſomething relating to the parallax of heavenly bodies. See the article PARALLAX.

PARALLAX, ϖαραλλαξις, in aſtronomy, denotes a change of the apparent place of any heavenly body, cauſed by being ſeen from different points of view; or it is the difference between the true and apparent diſtance of any heavenly body from the zenith.

Thus let A B (plate LXXII. fig. 10.) be a quadrant of a great circle on the earth's ſurface, A the place of the ſpectator, and the point V in the heavens the vertex and zenith. Let V N H repreſent the ſtarry firmament, A D the ſenſible horizon, in which ſuppoſe the ſtar C to be ſeen, whoſe diſtance from the center of the earth is T C. If this ſtar were obſerved from the center T, it would appear in the firmament in E, and elevated above the horizon by the arch D E; this point E is called the true place of the phænomenon or ſtar. But an obſerver viewing it from the ſurface of the earth at A, will ſee it at D, which is called its viſible or apparent place; and the arch D E, the diſtance between the true and viſible place, is what aſtronomers call the parallax of the ſtar, or other phænomenon.

If the ſtar riſe higher above the horizon to M, its true place viſible from the center is P, and its apparent place N; whence its parallax will be the the arch PN, which is leſs than the arch DE. The horizontal parallax, therefore, is the greateſt; and the higher a ſtar riſes, the leſs is its parallax; and if it ſhould come to the vertex or zenith, it would have no parallax at all: for when it is in Q, it is ſeen both from T and A in the ſame line TAV, and there is no difference between its true and apparent or viſible place. Again, the farther a ſtar is diſtant from the earth, ſo much the leſs is its parallax: thus the parallax of the ſtar F is only GD, which is leſs than DE the parallax of C. Hence it is plain, that the parallax is the difference of the diſtances of a ſtar from the zenith when ſeen from the center and from the ſurface of the earth: for the true diſtance of the ſtar M from the zenith is the arch VP, and its apparent diſtance VN, the difference between which PN is the parallax.

Theſe diſtances are meaſured by the angles VTM, and VAM, but $VAM - VTM = TMA$. For the external angle $VAM = \angle ATM + \angle AMT$, the two inward and oppoſite angles; ſo that AMT meaſures the parallax, and upon that account is itſelf frequently called the parallax: and this is always the angle under which the ſemi-diameter of the earth, AT, appears to an eye placed in the ſtar; and therefore where this ſemi-diameter is ſeen directly, there the parallax is greateſt, viz. in the horizon. When the ſtar riſes higher, the ſine of the parallax is always to the ſine of the ſtars diſtance from the zenith, as the ſemi-diameter of the earth to the diſtance of the ſtar from the earth's center: hence if the parallax of a ſtar be known at any one diſtance from the zenith, we can find its parallax at any other diſtance.

If we have the diſtance of a ſtar from the earth, we can eaſily find its parallax: for on the triangle TAC rectangular at A, having the ſemi-diameter of the earth, and TC the diſtance of the ſtar, the angle ACT, which is the horizontal parallax, is found by trigonometry; and on the other hand, if we have this parallax, we can find the diſtance of the ſtar; ſince in the ſame triangle, having AT, and the $\angle ACT$, the diſtance TC may be eaſily found.

Aſtronomers therefore, have invented ſeveral methods for finding the parallaxes of ſtars, in order thereby to diſcover their diſtances from the earth. However, the fixed ſtars are ſo remote as to have no ſenſible parallax; and even the ſun, and all the primary planets, except Mars and Venus when in perigee, are at ſo great diſtances from the earth, that their parallax is too ſmall to be obſerved. In the moon, indeed, the parallax is found to be very conſiderable, which in the horizon amounts to a degree or more, and may be found thus; in an eclipſe of the moon, obſerve when both its horns are in the ſame vertical circle, and at that inſtant take the altitudes of both horns: the difference of theſe two altitudes being halved, and added to the leaſt, or ſubſtracted from the greateſt, gives nearly the viſible or apparent altitude of the moon's center; and the true altitude is nearly equal to the altitude of the center of the ſhadow at that time. Now we know the altitude of the ſhadow, becauſe we know the place of the ſun in the ecliptic, and its depreſſion under the horizon, which is equal to the altitude of the oppoſite point of the ecliptic in which is the center of the ſhadow. And therefore having both the true altitude of the moon and the apparent altitude, the difference of theſe is the parallax required. But as the parallax of the moon increaſes as ſhe approaches towards the earth, or the perigæum of her orbit; therefore aſtronomers have made tables which ſhew the horizontal parallax for every degree of its anomaly.

The parallax always diminiſhes the altitude of a phænomenon, or makes it appear lower than it would do, if viewed from the center of the earth; and this change of the altitude may, according to the different ſituation of the ecliptic and equator in reſpect of the horizon of the ſpectator, cauſe a change of the latitude, longitude, declination and right-aſcenſion of any phænomenon, which is called their parallax.

The parallax, therefore, increaſes the right and oblique aſcenſion; diminiſhes the deſcenſion; diminiſhes the northern declination and latitude in the eaſtern part, and increaſes them in the weſtern; but increaſes the ſouthern both in the eaſtern and weſtern part; diminiſhes the longitude in the weſtern part, and increaſes it in the eaſtern. Hence it appears, that the parallax has juſt oppoſite effects to refraction. See the article REFRACTION.

Annual PARALLAX, the change of the apparent place of a heavenly body, which is cauſed by being viewed from the earth in different parts of its orbit round the ſun. See the article EARTH.

The annual parallax of all the planets is found very conſiderable, but that of the fixed ſtars is imperceptible. See STAR.

PARALLAX, in levelling, denotes the angle contained betweeen the line of the true level, and that of the apparent level.

PARALLEL, in geometry, an appellation given to lines, ſurfaces and bodies every where equidiſtant from each other; and which though infinitely produced would never meet.

PARALLEL PLANES, are ſuch planes as have all the perpendiculars drawn betwixt them equal to each other.

PARALLEL RAYS, in optics, are thoſe which keep at an equal diſtance from the viſible object to the eye, which is ſuppoſed to be infinitely remote from the object.

Parallel Ruler, or Parallelism, an inſtrument conſiſting of two wooden, braſs, *&c.* rulers, equally broad every where; and ſo joined together by croſs blades as to open to different intervals, accede and recede, and yet ſtill retain their paralleliſm.

Parallels, or *Parallel Circles*, in geography, called alſo parallels or circles of latitude, are leſſer circles of the ſphere, conceived to be drawn from weſt to eaſt, through all the points of the meridian, commencing from the equator to which they are parallel, and terminating with the poles.

They are called parallels of latitude, becauſe all places lying under the ſame parallel, have the ſame latitude.

Parallels *of Latitude*, in aſtronomy, are leſſer circles of the ſphere parallel to the ecliptic, imagined to paſs through every degree and minute of the colures.

They are repeſented on the globe by the diviſions on the quadrant of altitude, in its motion round the globe, when ſcrewed over the pole of the ecliptic.

Parallels *of Altitude*, or Almucantars, are circles parallel to the horizon, imagined to paſs through every degree and minute of the meridian between the horizon and zenith, having their poles in the zenith.

Parallels *of Declination*, in aſtronomy, are the ſame with parallels of latitude in geography.

Parallel *Sphere*, that ſituation of the ſphere, wherein the equator coincides with the horizon, and the poles with the zenith and nadir. See the article Sphere.

Parallel *Sailing*, in navigation, is the ſailing under a parallel of latitude.

PARALLELEPIPED, or Parallelopiped, in geometry, a regular ſolid comprehended under ſix parallelogrāms, the oppoſite ones whereof are ſimilar, parallel and equal.

All parallelepipeds, priſms, cylinders, &c. whoſe baſes and heights are equal, are themſelves equal.

A diagonal plane divides a parallelepiped into two equal priſms; ſo that a triangular priſm is half a parallelepiped upon the ſame baſe, and of the ſame altitude.

All parallelepipeds, priſms, cylinders, &c. are in a ratio compounded of their baſes and altitudes; wherefore, if their baſes be equal, they are in proportion to their altitudes; and converſely.

All parallelepipeds, cylinders, cones, &c. are in a triplicate ratio of their homologous ſides, and alſo of their altitudes.

Equal parallelepipeds, priſms, cones, &c. reciprocate their baſes and altitudes.

PARALLELISM, the ſituation or quality whereby any thing is denominated parallel. See the article Parallel.

Parallelism *of the Earth's Axis*, in aſtronomy, that ſituation of the earth's axis, in its progreſs through its orbit, whereby it is ſtill directed towards the pole-ſtar; ſo that if a line be drawn parallel to its axis, while in any one poſition, the axis, in all other poſitions, will be always parallel to the ſame line.

This paralleliſm is the reſult of the earth's double motion, viz. round the ſun, and round its own axis; or its annual and diurnal motion; and to it we owe the viciſſitudes of ſeaſons, and the inequality of day and night. See the article Earth.

PARALLELOGRAM, in geometry, a quadrilateral right-lined figure, whoſe oppoſite ſides are parallel and equal to each other. It is generated by the equable motion of a right line always parallel to itſelf. When it has all its four angles right, and only its oppoſite ſides equal, it is called a rectangle or oblong. When the angles are all right, and the ſides equal, it is called a ſquare. If all the ſides are equal, and the angles unequal, it is called a rhombus or lozenge: and if the ſides and angles be unequal, it is called a rhomboides.

PARALOGISM, in logic, a falſe reaſoning, or a fault committed in demonſtration, when a conſequence is drawn from principles that are falſe; or, though true, are not proved; or when a propoſition is paſſed over that ſhould have been proved by the way.

A paralogiſm differs from a ſophiſm in this, that the ſophiſm is committed out of deſign and ſubtlety, and the paralogiſm out of miſtake and for want of ſufficient light and application. See Sophism and Demonstration.

PARALYSIS, the palſy. See Palsy.

PARALYTIC, a perſon afflicted with the palſy. See the article Palsy.

PARAMETER, in conic ſections, a conſtant line, otherwiſe called latus rectum. See the articles Ellipsis, Hyperbola, and Parabola.

The parameter is ſaid to be conſtant, becauſe in the parabola, the rectangle under it and any abſciſs is always equal to the ſquare of the correſponding ſemi-ordinate; and in the ellipſis and hyperbola, it is a third proportional to the conjugate and tranſverſe axis.

PARAMOUNT, in law, ſignifies the ſupreme lord of the fee. See Fee.

PARAPET, in fortification, an elevation of earth deſigned for covering the ſoldiers from the enemies cannon or ſmall ſhot. The thickneſs of the parapet is from eighteen to twenty feet; its height is ſix feet on the inſide, and four or five on the outſide. It is raiſed on the rampart, and has a ſlope above called the ſuperior talus, and ſometimes the glacis of the parapet. The exterior talus of the parapet is the ſlope facing the country; there is a banquette or two for the ſoldiers who defend the parapet to mount upon, that they may the better diſcover the country, foſſe, and counterſcarpe, and fire as they find occaſion. See the articles GLACIS, TALUS, BANQUETTE, &c.

Parapet of the covert way, or corridor, is what covers that way from the ſight of the enemy, which renders it the moſt dangerous place for the beſiegers, becauſe of the neighbourhood of the faces, flanks, and curtins of the place.

PARAPET is alſo a little wall raiſed breaſt-high on the banks of bridges, keys, or high buildings, to ſerve as a ſtay, and prevent people's falling over.

PARAPHIMOSIS, in medicine, a diſorder of the penis, wherein the prepuce is ſhrunk, and withdrawn behind the glands, ſo as not to be capable of being brought to cover the ſame; which generally happens in venereal diſorders. See the article PREPUCE, &c.

PARAPHRASE, παραφρασις, an explanation of ſome text, in clearer and more ample terms, whereby is ſupplied what the author might have ſaid or thought on the ſubject; ſuch are eſteemed Eraſmus's paraphraſe on the New Teſtament, the Chaldee paraphraſe on the Pentateuch, &c.

PARAPHROSINE, a word uſed by medical writers to expreſs a delirium, or an alienation of mind in fevers, or from whatever cauſe.

PARAPLEGIA, or PARAPLEXIA, in medicine, a ſpecies of paralyſis, or palſy, uſually ſucceeding an apoplexy. See PALSY.

PARASELENE, in phyſiology, a mock moon, a meteor, or phænomenon, encompaſſing or adjacent to the moon, in form of a luminous ring; wherein are obſerved one, ſometimes two, apparent images of the moon.

The paraſelenes are formed after the ſame manner as the parhelia, or mock ſuns. See the article PARHELIUM.

PARASITE, παρασιτος, among the Greeks, was originally a very reputable title; the paraſites being a kind of prieſts (at leaſt miniſters) of the gods, in the ſame manner as the Epulones were at Rome.

They took care of the ſacred corn, or the corn deſtined for the ſervice of the temples, and the gods, viz. ſacrifices, feaſts, &c. they had even the intendance over ſacrifices, and took care that they were duly performed. At Athens, there was a kind of college of twelve paraſites; each people of Attica furniſhing one, who was always choſen out of the beſt families.

Polybius adds, that paraſite was alſo an honourable title among the ancient Gauls, and was given to their poets; but of late, it has been made a term of reproach, and uſed for a flatterer and mean dependant.

PARASITES, or *Paraſitical Plants*, in botany, ſuch plants as are produced out of the trunks or branches of other plants, from which they receive their nouriſhment, and will not grow upon the ground; as the miſletoe, &c.

PARATHENAR, in anatomy, the name of two muſcles of the foot; one of which, the parathenar major, is a pretty long muſcle, forming a part of the outer edge of the ſole of the foot.

It is fixed backward by a fleſhy body to the outer part of the lower ſide of the os calcis, from the ſmall poſterior external tuberoſity, all the way to the anterior tuberoſity: there it joins the metatarſus, and at the baſis of the fifth metatarſal bone ſeparates from it again, and forms a tendon, which is inſerted in the outſide of the firſt phalanx of the little toe, near its baſis, and near the inſertion of the other parathenar: this laſt is called a parathenar minor; being a fleſhy muſcle fixed along the poſterior half of the fifth bone of the metatarſus, and terminating under the head of that bone in a tendon, which is inſerted in the lower part of the baſis of the firſt phalanx of the little toe.

PARATHESIS, in grammar, the ſame with appoſition. See APPOSITION.

PARATITLES, *Paratitla*, in juriſprudence, ſhort notes or ſummaries of the titles of the digeſt and code; which have been made by ſeveral lawyers, in order to compare and examine the connection of the ſeveral parts with one another. See the articles DIGEST and CODE.

PARBUNCLE, in a ſhip, the name of a rope almoſt like a pair of ſlings: it is ſeized both ends together, and then put double about any heavy thing that is to be hoiſted in or out of the ſhip; having the hook of the runner hitched into it, to hoiſe it up by.

PARCÆ, in the heathen mythology, goddeſſes, who were ſuppoſed to preſide over the accidents and events, and to determine the date or period, of human life.

PARCHMENT, in commerce, the ſkins of ſheep or goats, prepared after ſuch a manner as to render it proper to writing upon, covering books, &c.

PAREGORICS, in pharmacy, medicines that aſſuage pain, otherwiſe called anodynes. See the article ANODYNES.

PARELCON, in grammar, a figure by which a word or ſyllable is added to the end of another.

PARELIUM, or PARHELIUM. See the article PARHELIUM.

PARENCHYMA, in anatomy, a term introduced by Eraſiſtratus, ſignifying all that ſubſtance which is contained in the interſtices between the blood-veſſels of the viſcera, which he imagined to be extravaſated and concreted blood. The moderns having diſcovered all the viſcera to be vaſculary and glandulous, have rejected this term, together with the doctrine.

PARENCHYMA *of Plants*. Grew applies the term parenchyma to the pith or pulp, or that inner part of a fruit or plant through which the juice is ſuppoſed to be diſtributed. This, when viewed with a microſcope, appears to reſemble marrow, or rather a ſponge, being a porous, flexible, dilatable ſubſtance. Its pores are innumerable and exceedingly ſmall, receiving as much humour as is requiſite to fill and extend them, which diſpoſition of pores it is that is ſuppoſed to fit the plant for vegetation and growth.

PARENT, *Parens*, a term of relation applicable to thoſe from whom we immediately receive our being. See FATHER and MOTHER.

PARENTALIA, in antiquity, funeral obſequies, or the laſt duties paid by children to their deceaſed parents.

It is alſo uſed for a ſacrifice, or ſolemn ſervice, offered annually to the manes of the dead.

PARENTHESIS, in grammar, certain intercalary words, inſerted in a diſcourſe, which interrupt the ſenſe, or thread, but ſeem neceſſary for the better underſtanding of the ſubject.

The proper characteriſtic of a parentheſis is, that it may be either taken in or left out, the ſenſe and the grammar remaining entire. In ſpeaking, the parentheſis is to be pronounced in a different tone; and in writing, it is encloſed between ( ), called alſo a parentheſis, but commonly a bracket, or crotchet, to diſtinguiſh it from the reſt of the diſcourſe. The politeſt of our modern writers avoid all parentheſes, as keeping the mind in ſuſpenſe, embarraſſing it, and rendering the diſcourſe leſs clear, uniform, and agreeable.

The parentheſis is frequently confounded with the parembole. See the article PAREMBOLE.

PARGET, in natural hiſtory, a name given to ſeveral kinds of gypſum, or plaſter-ſtone. See PLASTER.

PARGETING, in building, is uſed for the plaſtering of walls, and ſometimes for the plaſter itſelf.

Pargeting is of various kinds, as, 1. white-lime, hair, and mortar, laid upon bare walls: 2. on bare laths, as in partitioning and ceiling: 3. rendering the inſides of walls, or doubling partition walls: 4. rough-caſting upon heart-laths: 5. plaſtering on brick-work, with a finiſhing mortar in imitation of ſtone-work.

PARHELIUM, or PARHELION, in phyſiology, a mock ſun or meteor in form of a very bright light appearing on one ſide of the ſun.

The parhelia are formed by the reflection of the ſun's beams on a cloud properly poſited. They uſually accompany the coronæ, or luminous circles, and are placed in the ſame circumference and at the ſame height. Their colours reſemble that of the rainbow, the red and yellow are on the ſide towards the ſun, and the blue and violet on the other. There are coronæ ſometimes ſeen without parhelia, and *vice verſa*. Parhelia are double, triple, &c. and in 1629, a parhelion of five ſuns was ſeen at Rome; and in 1666, another at Arles of ſix.

M. Mariotte accounts for parhelia from an infinity of little particles of ice floating in the air, that multiply the image of the ſun by refraction or reflection; and by a geometrical calculus he has determined the preciſe figure of theſe little icicles, their ſituation in the air, and the ſize of the coronæ or circles which accompany the parhelia, and the colours wherewith they are painted. M. Huygens accounts for the formation of a parhelion in the ſame manner as for that of the halo. See the article HALO.

PARIETALIA OSSA, in anatomy, the ſecond and third bones of the cranium; being called alſo oſſa bregmatis, and oſſa-ſincipitis.

PARIETES, in anatomy, a term uſed for the incloſures or membranes, that ſtop up or cloſe the hollow parts of a body, eſpecially thoſe of the heart, thorax, &c.

PARIETARIA, PELLITORY OF THE WALL, in botany, a genus of plants, producing hermaphrodite and female, apetalous flowers; the calyx of each is a monophyllous perianthium: the ſtamina are four ſubulated filaments, topped with twin antheræ; there is no pericarpium, but the ſeed, which is ſingle, and of an oval form, is contained in the cup. Pellitory flowers in May, and grows upon old walls and buildings in ſeveral parts of England.

This plant is very famous in the materia medica as cooling and abſtergent. It is preſcribed in ſtranguries, and in caſes of gravel, or ſmall ſtones in the kidneys, and is an ingredient in decoctions for clyſters to be given in nephritic caſes. Externally, it is much recommended in the eryſipelas, and for the ſoftening of hard tumours.

PARIS, herb true-love, in botany, a plant producing cruciform flowers: the fruit is a globoſe berry, containing four cells, which are filled with ſeeds arranged in a double ſeries. This plant grows wild in moiſt ſhady woods in many parts of England.

PARISH, the precinct of a parochial church, or a circuit of ground inhabited by people who belong to one church, and are under the particular charge of its miniſter.

A pariſh may contain ſeveral villages within its limits, though in general it is accounted to contain no more than one, except the contrary be made to appear: and an antient village, which time out of mind has had a church of its own, and choſen overſeers, &c. may be a pariſh in reputation, ſo as to provide for its own poor only, and be excuſed from contributing to the poor of the pariſh in which it lies, 43 Eliz. c. 2.

In England there are nine thouſand, nine hundred and thirteen pariſhes, of which three thouſand, eight hundred and forty-five are churches impropriate, and the reſt are annexed to colleges, or church dignities. In many of theſe pariſhes, on account of their large extent, and the number of pariſhioners, there are ſeveral chapels of eaſe.

Parish-Officers, officers choſen annually to regulate and manage the concerns of the pariſh, for which ſee the articles Church-Wardens, and Overseers *of the Poor*.

PARK, a large incloſure privileged for wild beaſts of chace, either by preſcription or the king's grant. No perſon can now erect a park without his obtaining firſt a licence under the broad-ſeal; but there may be ſuch in reputation, though erected without lawful warrant, and the owner may bring his action againſt perſons that kill his deer therein. The pulling down walls, or pales, makes the offenders liable to the ſame penalty as for killing of deer.

Park, is alſo uſed for a moveable incloſure, or fold, ſet up in the fields for ſheep to feed and reſt in during the night. This park is frequently removed by the ſhepherds to dung the ground one part after another.

Park, alſo ſignifies a large net, placed on the brink of the ſea, with only one entrance, which is next to the ſhore, and which is left dry by the ebb of the tide, ſo that the fiſh once got in, have no way left to eſcape.

Park *of Artillery*. See the article Artillery-Park.

Park *of Proviſions*. See the article *Park of* Provisions.

PARKINSONIA, in botany, a genus of plants, whoſe flower conſiſts of five almoſt equal ſpreading petals; the ſtamina are ten declining filaments, terminated by oblong incumbent antheræ. The fruit is a long taper pod, with ſwelling joints, each articulation containing an oblong ſeed.

This plant grows naturally in the Spaniſh Weſt-Indies, where it riſes to the height of twenty feet or upwards: it bears long ſlender bunches of yellow flowers, which are pendent; they have a moſt agreeable ſcent, ſo as to perfume the air to a conſiderable diſtance; for which reaſon the inhabitants of the Weſt-Indies plant them near their habitations. It is propagated from ſeeds; but in this climate requires a ſtove to preſerve it.

PARLEY, a conference with an enemy. Hence to beat or ſound a parley, is to give a ſignal for holding ſuch a conference by beat of drum or ſound of trumpet.

PARLIAMENT, is the grand aſſembly of the three ſtates of this kingdom, ſummomed together, by the king's authority, to conſult of matters relating to the public welfare, and particularly to enact and repeal laws. It conſiſts of the king, the lords ſpiritual and temporal, and the commons, and is at once the ſeat of the legiſlative authority, and the higheſt court of juſtice in Great-Britain. In the houſe of lords, criminal cauſes are tried on the impeachment of the commons; and this houſe has an original juriſdiction for the trial of peers upon indictment found by a grand jury; the lords likewiſe try ſuch cauſes as come thither on appeals from the court of chancery, and all their decrees are as judgments. The houſe of commons examine the rights of elections, regulate diſputes concerning them, may expel their own members, and commit them to priſon; they are the grand inqueſt of the nation, and preſent public grievances or delinquents to the king and lords, in order to their being puniſhed. In ſhort, they are the repreſentatives of all the commons in the kingdom, and in them their conſtituents have placed the higheſt confidence, by inveſting them with the power of making laws, and entruſting them with all their liberties and privileges. Originally, new parliaments were called every year; but by degrees their term grew longer. In the reign of king Charles II. they were held a long time, with great interruptions between: but both methods were found of ſuch ill conſequence, that, in the beginning of the reign of king William III. an act paſſed, by which the term of all parliaments was reſtrained to three ſeſſions, or three years; this was hence called the triennial act: but ſince that time, from other views, the period of parliaments has been lengthened to ſeven years.

PARLOUR, a fair lower room, deſigned principally for the entertainment of company. See Apartment.

PARNASSIA, in botany, a genus of plants, whoſe flower has five roundiſh, emarginated, ſtriated, concave, patent petals, with five cordated nectariums, and the ſame number of ſubulated filaments, terminated with depreſſed incumbent antheræ. The fruit is an oval four-cornered capſule, with one cell, containing a number of oblong ſeeds.

PAROCHIAL, ſomething belonging to a pariſh. See Parish, Church, &c.

PARODICAL *Degrees of an Equation*, in algebra, are the ſeveral regular terms in quadratic, cubic, biquadric equations, &c. the indexes of whoſe powers aſcend or deſcend orderly in an arithmetical progreſs, as $z^3 + z^2 m + zr = s$, is a cubical equation, where no term is wanting, but having all its parodic degrees, the indexes of the terms regularly deſcending thus, 3, 2, 1, 0.

PARODY, ϖαρωδια, a popular maxim, adage, or proverb.

Parody is alſo a poetical pleaſantry, conſiſting in applying the verſes written on one ſubject, by way of ridicule to another; or in turning a ſerious work into a burleſque, by affecting to obſerve, as nearly as poſſible, the ſame rhymes, words, and cadences.

It comes near to what ſome of our late writers call traveſty; and was firſt ſet on foot by the Greeks, from whom we borrow the name.

PAROL, or PAROLE, in law, is uſed for a plea in court: ſometimes this word is joined with the term leaſe; thus leaſe-parol denotes a leaſe by word of mouth, in order to diſtinguiſh it from a leaſe in writing.

PARONYCHIA, whitlow, in medicine, an inflammatory and exceeding painful diſorder, which inveſts all the joints, and particularly the ends of the fingers; being generally much ſwelled with a beating or throbbing, and intenſe heat. There is ſometimes little or no tumour obſerved, when the diſorder lies deep at, or in the bone; and ſometimes again the tumour, pain, and inflammation, are extended from the finger, up to the elbow, or even to the ſhoulder, from the communication of the fingers with thoſe parts by the flexor-muſcles.

For the cure of a paronychia, Garengeot propoſes inciſion before any trial has been made with other remedies; but Heiſter, agreeably to the advice of Hippocrates, is of opinion, that the diſorder may be frequently diſperſed and removed by the uſe of deluent, diſcutient, and cooling remedies, without any inciſion. The moſt approved method for removing an inflammation and obſtruction in this manner, is to let the patient hold his finger, for ſeveral hours, in ſpirit of wine, highly rectified, and in which has been infuſed camphor or theriaca. See the articles DISPERSION, DILUENT, DISCUTIENT, &c.

But when there is already a ſuppuration actually formed, either before or under the uſe of theſe means, then an inciſion is the only remedy. In the firſt ſpecies of this diſorder, the ſurgeon, as ſoon as he perceives the matter to point, or form a little protuberance, ought to hold and preſs it between the finger and thumb of his left hand, while he makes a longitudinal inciſion therein, with his right, by which means the matter being diſcharged, the finger will then heal almoſt of itſelf. In the ſecond ſpecies of the paronychia, an inciſion is to be made according to the preceding directions; only then more care is to be taken, that the knife penetrate to the bone: the inciſion being made, the blood ſhould be ſuffered to flow out a little while, either of itſelf, or elſe it ſhould be preſſed out; then the wound is to be dreſſed with dry lint, and diachylon plaſter, with a compreſs dipped in warm ſpirit of wine, and retained on by a proper bandage: the wound is next to be treated like thoſe in which the bones are affected, viz. with eſſence of myrrh, amber, balſam of Peru, &c.

PAROTIDES, in anatomy, two very remarkable glands, ſituated one on each ſide, between the ear and the angle of the lower jaw, and often extending themſelves over a great part of the maſſeter. From each of theſe glands there runs a very large duct, about three fingers-breadth long, and of the thickneſs of a wheat-ſtraw, having a great number of roots: this duct, from Steno, the diſcoverer, is by ſome called ductus ſalivalus Stenonius, by others ductus ſalivalus ſuperior. It paſſes over the maſſeter-muſcle, through the middle of the cheek, and there perforates the buccinator-muſcle, and the membrane of the mouth, near the ſecond or third of the dentes molares, and at this perforation it diſcharges a very large quantity of its proper fluid into the mouth. The parotides are among thoſe glands that ſerve for the ſecretion of the ſaliva. See the articles GLAND and SALIVA.

PAROTIDES is alſo the name of certain tumours or inflammations ariſing behind the ears, or the parotid glands.

PAROXISM, in medicine, the ſevere fit of a diſeaſe, under which it grows higher, or exaſperates, as of the gout, &c.

It is alſo uſed for the acceſs or return of a diſeaſe, as an ague, &c.

PARRELS, in a ſhip, are frames made of trucks, ribs, and ropes, which having both their ends faſtened to the yards, are ſo contrived, as to go round about the maſt; that the yards, by their means, may go up and down upon the maſts; theſe alſo, with the breaſt-ropes, faſten the yards to the maſts.

PARRICIDE, *Parricida*, or *Patricida*, ſtrictly ſignifies the murder or murderer of a father, as matricide does of a mother; yet this word is ordinarily taken in both ſenſes, and is alſo extended to the murder of any near relation, as huſband, wife, brother, ſiſter, child, grand-child, uncle, &c. and even to that of great or ſacred perſons, though no way allied in blood, as a king, &c.

PARROQUET, in ornithology, a ſubdiviſion of parrots. See the next article.

PARROT, *Pſittacus*, a genus of birds, of the order of the accipitres, the characters of which are theſe; the beak is of a hooked or uncinated figure; and the toes are four on each foot, two forwards and two backwards.

PARRYING, in fencing, the action of warding off the blows aimed at one by another. See the article FENCING.

PARSLEY, *Apium*, in botany, a genus of umbelliferous plants; the flower is compoſed of five pale petals, with five ſtamina; theſe are ſucceeded by ſeeds that are joined by pairs, and are ſlender, furrowed, grey, and roundiſh at the back. Parſley is cultivated in gardens for culinary purpoſes, it being more uſed in the kitchen than any other herb whatſoever; it will tolerably endure cold, but is apt to be deſtroyed in very ſevere winters, eſpecially where the land is moiſt; it is commonly ſown in the ſpring, and ſends forth a ſtalk the year after, which flowers in June or July, and the ſeeds ripen in Auguſt.

The common parſley is, by ſome ſkilful people, cultivated in fields for the uſe of ſheep, it being a ſovereign remedy to preſerve them from the rot, provided they are fed twice a week, for two or three hours each time, with this herb: but hares and rabbets are ſo fond of it, that they will come from a great diſtance to feed on it; ſo that whoever has a mind to have plenty of hares in their fields, by cultivating parſley, will draw all the hares off the country to them.

The leaves of parſley are cooling, and good for cleanſing the viſcera; they alſo abſterge much ſlime and viſcid adheſions from the ſtomach and bowels, cleanſe all the paſſages, keep the juices fluid, and greatly aſſiſt their diſcharge by urine. The root is one of the five opening roots; it is attenuant, aperient, detergent, and diuretic; it is good in decoctions, diet-drinks, and medicinal ales, for cleanſing the blood (as it is commonly called) and draining off ill humours by urine. The ſeed is one of the four hot ſeeds, and is ſaid to be good in the gravel and dropſy.

Macedonian PARSLEY. See the article BUBON.

PARSNEP, *Paſtinaca*, in botany, a genus of umbelliferous plants, the univerſal flower of which is uniform, and the particular ones are each compoſed of five lanceolated incurved petals, with five hairy ſtamina; there is no pericarpium, but the fruit, which is plane, elliptical, and compreſſed, is compoſed of two flattiſh marginated ſeeds.

The garden parſnep is propagated by ſowing its ſeeds in February or March, on a rich ground of a good depth, and afterwards hoed out as is practiſed with turneps, and in autumn the roots are to be dug up, and preſerved for winter and ſpring uſe: the year after ſowing, the flower-ſtalk ariſes to the height of three or four feet, and is upright, firm, furrowed, hollow, and branched; the leaves are large and compoſed of other leaves, that are villous, dentated on their edges, and winged; they are of a browniſh green, and placed by pairs along the rib, which is terminated by a ſingle leaf; the flowers are yellow, and come out in July or Auguſt, and the ſeeds are ripe about the beginning of September.

The roots of this plant are of great uſe as food, for which they are chiefly cultivated; they are more nouriſhing than carrots, though ſome people have a natural averſion to their uſe. The roots and ſeeds of wild parſnep are ſometimes uſed in medicine, and are recommended as a remedy againſt agues, and are reckoned good in flatulencies and cholics.

PARSON, the rector or incumbent of a pariſh-church. See the articles CHURCH and CLERGY.

PARSON IMPARSONEE, ſignifies one that is in poſſeſſion of a church, whether it be preſentative or or impropriate, and with whom the church is then full.

PARSONAGE, a rectory or pariſh-church, endowed with a houſe, glebe, lands, tythes, &c. for the maintenance of a miniſter, with cure of ſouls within ſuch pariſh. There may, notwithſtanding, be a parſonage without either glebe or tythes, but only annual payments inſtead thereof.

PART, *Pars*, a portion of ſome whole, conſidered as divided or diviſible.

Conſent of PARTS, in medicine. See the article CONSENT.

PART, in geography and aſtronomy, is applied to the diviſion of lines and circles, &c.

Aliquot PART, and *Aliquant* PART, in arithmetic. See the articles ALIQUOT and ALIQUANT.

Proportional PART, is a part or number agreeable or analogous to ſome other part or number; or a medium to find ſome number or part unknown, by proportion and equality of reaſon.

Similar PARTS, are thoſe which are to one another, as their wholes are to one another.

PART, in muſic, denotes a piece of the ſcore, or partition, written by itſelf, for the conveniency of the muſician; or, it is one or more of the ſucceſſions of ſounds, which make the harmony, written apart. Or, the parts are the ſounds made by ſeveral perſons, ſinging or playing in concert.

Muſic in parts was unknown to the ancients; they had but one part: all their harmony conſiſted in the ſucceſſion of notes, none in the conſonance.

There are four principal parts, the treble, baſe, tenor, and counter-tenor. Some compare the four parts in muſic to the four elements; the baſe, they ſay, repreſents the earth; the tenor, the water; counter-tenor, air; and treble, fire.

PARTS *of Speech*, in grammar, are all the ſorts of words which enter the compoſition of diſcourſe. See SPEECH.

The grammarians generally admit of eight parts of ſpeech, viz. noun, pronoun, verb, participle, adverb, prepoſition, interjection, and conjunction. See NOUN, PRONOUN, &c.

PARTERRE, in gardening, a level diviſion of ground, which, for the moſt part, faces the ſouth and beſt front of the houſe; and is generally furniſhed with greens, flowers, &c.

There are ſeveral ſorts of parterres, as plain graſs with borders, and parterres of embroidery, &c.

Plain parterres are more beautiful in England than in any other country, by reaſon of the excellency of our turf, and that decency and unaffected ſimplicity that it affords to the eye of the ſpectator. Other parterres are cut into ſhell and ſcroll work, with ſand alleys between them; which ſort of parterres are eſteemed fineſt in France.

As to the general proportions of parterres, an oblong, or long ſquare, is eſteemed the beſt: therefore, a parterre ſhould not be leſs than twice as long as it is broad; twice and a half is accounted a very good proportion; and it is very rare that three times is exceeded. As to the breadth of a parterre, it is to take its dimenſions from the breadth of the front of the houſe; if the front of the houſe is one hundred feet long, the breadth of the parterre ſhould be one hundred and fifty feet; and if the front of the houſe be two hundred feet, the parterre ſhould be fifty feet broader: but where the front exceeds the breadth of this parterre, it will be a good proportion to make the parterre of the ſame dimenſions with the front.

There ſhould be a terrace-walk on each ſide of the parterre, for an elevation proper for view; and therefore, there ſhould never be the flat of a parterre between terrace-walk and terrace-walk, above three hundred feet; nor can it be well made leſs than one hundred and forty. As to the adorning and furniſhing theſe parterres, whether it be plain or with embroidery, that depends much upon the form of them, and therefore muſt be left to the judgment and fancy of the deſigner.

PARTHENIUM, American-feverfew, in botany, a genus of plants, the compound flower of which is convex; there are ſeveral corollulæ in the diſc, which are monopetalous, tubuloſe, ligulated, erect, quinquifid at the mouth, and of the length of the cup; the female flowers are alſo monopetalous, but they are tubulated, ligulated, oblique, obtuſe, roundiſh, and of the length of the hermaphrodite ones; they are five in number, and are placed in the verge or radius: there is no other fruit but the cup, which remains upon the plant unaltered: the ſeeds in the hermaphrodite flowers are abortive; and in the female it remains in the cup, and is ſingle, of a turbinato-cordated form, compreſſed, and naked.

The leaves and flowers of this plant are recommended in frigid and flatulent affections of the uterus, in obſtructions of the menſes, in venereal weakneſſes, and in the dropſy. They are alſo of great uſe in putrid fevers, the ſtone in the kidneys, vertigo, and arthritis.

PARTI, PARTIE, PARTY, or PARTED, in heraldry, is applied to a ſhield or eſcutcheon, denoting it divided or marked out into partitions. See the articles SHIELD, &c.

PARTI *per Pale*, is when the ſhield is divided perpendicularly into two halves, by a cut in the middle from top to bottom.

PARTI *per Feſs*, is when the cut is acroſs the middle, from ſide to ſide.

PARTI *per Bend Dexter*, is when the cut comes from the upper corner of the ſhield, on the right hand, and deſcends athwart to the oppoſite lower corner.

PARTI *per Bend Siniſter*, is when the cut, coming from the upper left corner, deſcends acroſs to the oppoſite lower one.

From theſe four partitions have proceeded an infinite number of others, of various and extravagant forms.

PARTICIPATION, that which gives a part or ſhare in any thing, either by right or grace.

PARTICIPLE, *Participium*, in grammar, an adjective formed of a verb, ſo called becauſe it participates partly of the properties of a noun, and partly of thoſe of a verb; being variable through genders and caſes, like the former; and regarding time, action, paſſion, &c. in manner of the latter. See NOUN and VERB.

In our language, the participles and gerunds are not at all diſtinguiſhable. See GERUND.

PARTICLE, in phyſiology, the minute part of a body, an aſſemblage of which conſtitute all natural bodies. See ATOM and MATTER.

It is the various arrangement and texture of theſe particles, with the difference of coheſion, &c. that conſtitute the various kinds of bodies. The ſmalleſt particles cohere with the ſtrongeſt attraction, and compoſe bigger particles of weaker coheſion, and many of theſe cohering compoſe bigger particles, whoſe vigour is ſtill weaker; and hereupon the operations in chemiſtry, and the colours of natural bodies depend, and which, by cohering, compoſe bodies of ſenſible bulk.

The coheſion of the particles of matter, the Epicureans imagined, was affected by means of hooked atoms; the Ariſtotelians, by reſt; but Sir Iſaac Newton ſhews, that it is done by means of a certain power, whereby the particles mutually attract and tend towards each other. By this attraction of the particles, he ſhews, that moſt of the phænomena of the leſſer bodies are affected, as thoſe of the heavenly bodies are, by the attraction of gravity. See ATTRACTION and GRAVITATION.

PARTICLE, in grammar, a denomination for all thoſe ſmall words that tie or unite others together, or that expreſs the modes or manners of words, uſually included, by grammarians, under theſe four parts of ſpeech, viz. adverbs, prepoſitions, interjections, and conjunctions. See the articles PARTS *of Speech*, ADVERB, &c.

PARTIES, in law, ſignify the perſons that are named in a deed or fine, viz. thoſe that made the deed, or levied the fine, and alſo thoſe to whom the ſame was made or levied.

PARTING, or DEPARTING, a method of ſeparating gold and ſilver, by means of aqua-fortis; for the operation of which, ſee ASSAYING and QUARTATION.

PARTITION, in law, ſignifies a diviſion of lands, &c. deſcended by common law or cuſtom among coheirs or parceners, being two at leaſt. Partition may alſo be made by joint tenants, and tenants in common by aſſent, deed, or writ. See CO-PARCENERS.

PARTNER, and PARTNERSHIP. See the article FELLOWSHIP.

PARTRIDGE, in ornithology, is a ſpecies of tetrao, with a naked ſcarlet mark behind the eyes.

The common partridge is too well known to need a farther deſcription: it is common in fields, and called by authors perdix. But beſides the common kind, there is another ſomewhat larger ſpecies, called the red-legged partridge, with a grey tail, variegated in the upper part with brown.

PARTURITION, the ſame with delivery. See DELIVERY.

PARULIDES, in ſurgery, tumours and inflammations of the gums, commonly called gum-boils.

They are to be treated with diſcutients, like other inflammatory tumours. Sage, camomile, and elder-flowers, boiled in milk or water, make a gargariſm to be held in the mouth warm; and the remaining herbs may be ſewed up in a bag, and applied hot to the cheeks. See the article DISPERSION.

But if the diſorder cannot be thus diſperſed, emollient applications of mallows, &c. are good; and to forward the matturation externally, a half-roaſted fig may be applied: and when the ſoftneſs of the tumour ſhews that the matter is ſuppurated, it ought immediately to be opened by the lancet, to prevent the matters lodging there, and eroding the bone, and producing a fiſtula or caries. After it is opened, the matter ſhould be gently preſſed out with the fingers, and the mouth frequently waſhed with red wine, mixed with a decoction of vulnerary herbs, till it is well.

When the ulcer has penetrated deep, it will be neceſſary to inject the ſame liquors with a ſyringe, and compreſs the part by a proper external bandage, to make the bottom heal firſt; and when it is already become fiſtulous, and has callous edges, it may then often be cured by injecting tincture of myrrh, and elixir proprietatis, continuing this for ſome time. If all theſe prove ineffectual, the fiſtula muſt be laid open by inciſion, and the caries removed by medicines, cauſtics, or the actual cautery. If this proceeds, as ſometimes it does, from a carious tooth, this is firſt of all to be extracted, otherwiſe the tumour will degenerate into a fiſtula: and it is always beſt to be early in making the inciſion.

PASPALUM, in botany, a genus of plants, whoſe flower is a bivalvular glume, with three capillary filaments, topped with ovate antheræ: the fruit is a perſiſtent glume, in which is placed one roundiſh compreſſed ſeed.

PASQUE. See PULSATILLA.

PASQUIN, a mutilated ſtatue at Rome, in the corner of the palace of the Urſini.

It takes its name from a cobler of that city, called Paſquin, famous for his ſneers and gibes, and who diverted himſelf with paſſing his jokes on all the people who went through the ſtreet. After his death, as they were digging up the pavement before his ſhop, they found in the earth the ſtatue of an ancient gladiator, well cut, but maimed, and half ſpoiled; this they ſet up in the place where it was found, and by common conſent named it Paſquin. Since that time, all ſatires are attributed to that figure, and are either put into its mouth or paſted upon it, as if they were wrote by Paſquin redivivus; and theſe are addreſſed by Paſquin to Marforio, another ſtatue at Rome. When Marforio is attacked, Paſquin comes to his aſſiſtance; and when Paſquin is attacked, Marforio aſſiſts him in his turn.

PASQUINADE, a ſatirical libel faſtened to the ſtatue of Paſquin: theſe are commonly ſhort, merry, and pointed; and hence the term has been applied to all other lampoons of the ſame caſt.

The difference between a paſquinade and a ſatire is, that the end of the latter is to correct and reform, while that of the former is only to ridicule and expoſe.

PASS, a ſtraight, difficult, and narrow paſſage, which ſhuts up the entrance into a country.

The firſt care of the general of an army is to ſeize the paſſes of the country into which he would carry the war, to fortify them, and take care that they are well guarded.

PASS *of Arms*, in chivalry, a bridge, road, &c. which the ancient knights undertook to defend.

PASS, or PASSADE, in fencing, an advance or leap forward upon the enemy.

PASSADE, in the manege, is a turn or courſe of a horſe backwards or forwards, on the ſame ſpot of ground.

PASSAGE, in the manege, is a horſe's walking or trotting in ſuch a manner that he raiſes the outward hind-leg, and the inward fore leg together; and ſetting theſe two on the ground, raiſes the other two alternately, never gaining above a foot of ground at a time.

PASSAGE, or PASSO, in muſic, a part of an air or tune, conſiſting of ſeveral ſhort notes, as quavers, ſemi-quavers, &c. laſting one, two, or, at moſt, three meaſures, in the beginning of a piece, which is to be afterwards imitated in the other notes of the piece, not with the ſame chords or notes, but only by obſerving the ſame motion, number, and figure, as in the notes of the firſt paſſage. This is called by the Italians, contrapunto d'un ſol paſſo.

Birds of PASSAGE, a name given to thoſe birds which, at certain ſtated ſeaſons of the year, remove from certain countries, and at other ſtated times return to them again, as our quails, woodcocks, ſtorks, nightingales, ſwallows, and many other ſpecies.

Right of PASSAGE, in commerce, is an impoſition or duty exacted by ſome princes, either by land or ſea, in certain cloſe and narrow places in their territories, on all veſſels and carriages, and even ſometimes on perſons or paſſengers, coming in or going out of ports, &c.

The moſt celebrated paſſage of this kind in Europe is the Sound, the dues for paſſing which ſtrait belong to the king of Denmark, and are paid at Elſenore or Cronenburg.

PASSANT, in heraldry, a term applied to a lion or other animal, in a ſhield, appearing to walk leiſurely. For moſt beaſts, except lions, the term trippant is frequently uſed inſtead of paſſant.

PASSERES, the name of a claſs of birds with a conic and much attenuated beak. See the article ORNITHOLOGY.

PASSERINA, ſparrow-wort, in botany, a genus of plants, whoſe flower is monopetalous, the tube whereof is ſlender, narrow, and ſwelling in the middle; the limb is patent, and divided into four ſegments: the ſtamina are eight ſetaceous filaments, topped with erect antheræ; and the fruit is an oval, coriaceous, unilocular capſule, containing a ſingle ovate ſeed, pointed at both ends.

PASSIFLORA, the paſſion-flower, in botany, a genus of plants, whoſe flower-cup is formed of five plane coloured leaves; the corolla conſiſts of five ſemi-lanceolated obtuſe petals; the nectarium hath a triple crown, the exterior of which is longer, and faſtened to the inſide of the petal, but is larger and compreſſed above: the ſtamina are five ſubulated filaments, faſtened at their baſe to the column of the ſtyle, annexed to the germen, ſpreading out, and terminated by oblong, obtuſe, incumbent antheræ: the fruit is an ovate, fleſhy, unilocular berry, ſupported on a pedicle, and contains a number of ovate ſeeds, faſtened longitudinally to the bark of the pericarpium.

The common paſſion-flower hath long ſlender ſtalks, which run a great length, and require ſupport; they are covered with a purpliſh bark, and are furniſhed at each joint with a digitated leaf, compoſed of five ſmooth entire lobes, connected with the ſtalk by pedicles, about two inches long, having two ſmall leaves embracing the ſtalks at their baſe; and from the ſame point comes out a long tendril, which twiſts round the neighbouring ſupport; the flowers come out at the ſame joints as the leaves, ſupported on foot-ſtalks almoſt three inches long; theſe flowers have a faint ſmell, and continue but one day; they come out in July, and there is a diurnal ſucceſſion till the froſt in autumn puts a ſtop to them.

This plant may be propagated either from ſeeds, layers, or cuttings; they require a good aſpected wall; where they may have height for their ſhoots to extend, which ſhould be properly trained againſt it; and in the ſpring the plants muſt be pruned, when all the ſmall weak ſhoots ſhould be cut off, and the ſtrong ones ſhortened to about four or five feet long, which will cauſe them to put out ſtrong ſhoots for flowering the following ſummer.

PASSION-FLOWER, *Paſſiflora*, in botany. See the article PASSIFLORA.

PASSIONS, in moral philoſophy, are certain motions of the ſoul, which makes it purſue what appears to be good, and avoid whatever threatens evil. See the articles GOOD and EVIL.

PASSIONS, in medicine, make one of the nonnaturals, and produce very ſenſible effects. Joy, anger, and fear, are the principal. In the two firſt, the ſpirits are hurried with too great vivacity; whereas, in fear or dread, they are as it were curbed and concentrated: whence we may conclude, that they have a very bad effect upon health; and therefore, it will be beſt to keep them within bounds as much as poſſible, and to preſerve an inward ſerenity, calmneſs, and tranquility.

Continual ſorrow and anguiſh of mind, render the fluids thick, and generate viſcid and acid crudities in the ſtomach, and at length render the body unapt for a due circulation; whence proceed obſtructions of the viſcera, and many chronical diſorders.

Anger conſtringes the bilious veſſels in particular; and cauſes too great an evacuation of the bile, produces ſtrictures in the ſtomach and duodenum; whence the bilious humours are amaſſed and corrupted; laying a foundation for vomiting, billious fevers, and cardialgiæ.

PASSIONS, in painting, are the external expreſſions of the different diſpoſitions and affections of the mind; but particularly their different effects upon the ſeveral features of the face: for though the arms, and indeed every part of the body, ſerve likewiſe, by their quick, languid, and variouſly diverſified motions, to expreſs the paſſions of the ſoul; yet, in painting, their difference is moſt conſpicuous in the face.

PASSIONS, in poetry, are of ſingular uſe in diſtinguiſhing the characters of the actors. See the article CHARACTER.

PASSION, or *Croſs of the* PASSION, in heraldry, is ſo called, becauſe reſembling the ſhape of that on which our Saviour is thought to have ſuffered; that is, not croſſed in the middle, but a little below the top, with arms ſhort in proportion to the length of the ſhaft.

PASSION-WEEK, the week immediately preceding the feſtival of Eaſter: ſo called, becauſe in that week our Saviour's paſſion and death happened.

PASSIVE, in general, denotes ſomething that ſuffers the action of another, called an agent, or active power.

PASSOVER, a ſolemn feſtival of the Jews, celebrated on the fourteenth day of the month next after the vernal equinox, and inſtituted in commemoration of their coming out of Egypt; becauſe on the night before their departure, the deſtroying angel, who put to death the firſt-born of the Egyptians, paſſed over the houſes of the Hebrews, which were ſprinkled with the blood of a lamb. The whoſe tranſaction is related in the twelfth chapter of Exodus.

PASS-PAROLE, a command given at the head of an army, and thence communicated to the rear by paſſing it from mouth to mouth.

PASS-PAR-TOUT, a maſter-key; or a key that opens ſeveral locks belonging to the ſame houſe or apartment.

PASS-PORT, or PASS, a licence or writing obtained from a prince or governor, granting liberty and ſafe conduct to paſs through his territories without moleſtation.

PASTBOARD, a kind of thick paper formed of ſeveral ſheets of paper paſted together.

PASTE, a compoſition of water and flower, boiled to a conſiſtence; uſed by various artificers, as ſadlers, upholſterers, bookbinders, &c.

PASTEL, a name by which ſome call iſatis, or woad. See the article ISATIS.

PASTERN *of a Horſe*, in the manege, is the diſtance between the joint next the foot, and the coronet of the hoof. This part ſhould be ſhort, eſpecially in middle-ſized horſes, becauſe long paſterns are weak, and cannot ſo well endure travelling.

PASTERN-JOINT, the joint next a horſe's foot.

PASTIL, or PASTEL, among painters, a kind of paſte made of different colours, ground up with gum-water, in order to make crayons. See the article CRAYON.

PASTIL, in pharmacy, is a dry compoſition of ſweet-ſmelling reſins, aromatic woods, &c. ſometimes burnt to clear and ſcent the air of a chamber.

PASTINICA, the parſnep, in botany. See the article PARSNEP.

PASTOR, properly ſignifies a ſhepherd, but is now generally uſed for a parſon or miniſter that hath cure of ſouls.

PASTORAL, in general, ſomething that relates to ſhepherds; hence we ſay, paſtoral life, manners, poetry, &c.

The original of poetry is aſcribed to that age which ſucceeded the creation of the world: and as the keeping of flocks ſeems to have been the firſt employment of mankind, the moſt antient ſort of poetry was, probably, paſtoral. It is natural to imagine, that the leiſure of thoſe antient ſhepherds admitting and inviting ſome diverſion, none was ſo proper to that ſolitary and ſedentary life as ſinging; and that in their ſongs they took occaſion to celebrate their own felicity. From hence a poem was invented, and afterwards improved to a perfect image of that happy time; which, by giving us an eſteem for the virtues of a former age, might recommend them to the preſent. And ſince the life of ſhepherds was attended with more tranquility than any other rural employments, the poets chuſe to introduce their perſons, from whom it received the name of paſtoral.

PASTORAL COLUMN. See COLUMN.

PASTORAL STAFF, the ſame with croſier. See the article CROSIER.

PASTRY, that branch of cookery, which is chiefly taken up in making pies, paſties, cakes, &c.

PASTURE, or PASTURE-LAND, that reſerved for feeding cattle.

Paſture-land is of ſuch advantage to huſbandry that many prefer it even to corn-land, becauſe of the ſmall hazard and labour that attends it, and as it lays the foundation for moſt of the profit that is expected from the arable land, becauſe of the manure the cattle afford which are fed upon it. Where dung is not to be bought, as is often the caſe in places diſtant from large towns, the farmer is forced to proportion his arable to his paſture land, in ſuch manner, that the cattle fed on the latter may be ſufficient for a ſupply of dung, ſo neceſſary for producing the fruits of the former.

Paſture-lands are of three kinds: 1. The uplands: theſe lie ſo high as not to be overflowed by rivers, or land-floods. 2. Thoſe low lands which lie near rivers and fens. And, 3. Thoſe that lie near the ſea. See the articles UPLAND, MARSHLAND, &c.

Paſture-land requires the refreſhment of dung, as well as the arable or corn-land; but there is to be a difference made in the laying it on and ſpreading it. A harrow performs the office of ſpreading the dung on ploughed lands; but the beſt contrivance for paſtures is, to lay the dung in ſmall heaps, and draw over it a gate ſtuck full of buſhes. All dung that is laid on paſture-land, muſt be laid on in winter, that the rain may waſh its fatneſs into the ground before the ſun ſcorches it, or evaporates its goodneſs. Fine mould mixed with the dung, and ſpread with it over the land, is very good for paſtures; for it is waſhed down to the very roots of the graſs, and gives them a new and fine ſoil in thoſe places where it is moſt wanted.

The beſt manure for paſture-land is the rotten bottoms of old hay-ſtacks; for theſe moulder away into a very rich ſoil, and are always full of vaſt quantities of ſeed, fallen at times from the hay, which all grow when ſpread on the ground: and thus new nouriſhment, and a new ſet of plants are given at once to the exhauſted ground. But as particularly uſeful as this is for paſture-ground, it is as improper for corn-land, and ſhould by no means ever be ſuffered to mix with the manure for thoſe grounds; as it will then raiſe graſs and other plants, which though of uſe in the paſture are weeds among the corn.

Admeaſurement of PASTURE. See the article ADMEASUREMENT.

PASTURE *of Plants*, a term uſed by Tull, for the nouriſhment they draw from the earth. See the articles PLANT and VEGETATION.

PASTY, in cookery, a preparation of veniſon, veal, lamb, or other meat; which being well boned, beaten to a pulp, and highly ſeaſoned, is incloſed in a proper paſte, and baked in an oven.

PATAGONULA, in botany, a genus of plants, whoſe flower-cup is a ſmall, perſiſtent, quinquedentated perianthium; the corolla is monopetalous and wheel-ſhaped, with ſcarce any tube; the limb is plane, and divided into five ovate acute ſegments. The fruit is an ovate acuminated capſule, containing a number of roundiſh ſeeds.

PATAVINITY, *Patavinitas*, among critics, denotes a peculiarity of Livy's diction, derived from Patavium, or Padua, the place of his nativity; but wherein this pavinity conſiſts, they are by no means agreed.

PATE'E, or PATTE'E, in heraldry, a croſs ſmall in the center, and widening to the extremes, which are very broad.

PATELLA, in anatomy, a bone which covers the fore-part of the joint of the knee, called alſo rotula, and popularly the knee-pan. The patella is convex on the outſide, and on the inſide unequal, having an eminence and two depreſſions. Its ſubſtance is ſpungeous, and conſequently it is brittle: it is connected by tendons and ligaments to the tibia and the os femoris, which is the ligament by which it is connected to the thigh, and has a motion of aſcent and deſcent in the flexion of the tibia. In infants and children it is cartilaginous.

PATENT, in general, denotes ſomething that ſtands open or expanded: thus a leaf is ſaid to be patent when it ſtands almoſt at right angles with the ſtalk.

PATENT, or LETTERS PATENT. See the article LETTER.

PATENTEE, a perſon to whom the king has granted his letters-patent.

PATER PATRATUS, in Roman antiquity, the principal perſon among the feciales or college of heralds. See the article FECIALES.

PATER-NOSTER, the Lord's prayer, ſo called from the two firſt words in Latin. It is alſo ſometimes uſed for a chaplet or ſtring of beads. And, in architecture, the ſame term is uſed for a ſort of ornament cut in the form of beads, either oval or round, uſed on aſtragals, baguettes, &c.

PATH, in general, denotes the courſe or tract marked out to run over, by a body in motion. See MOTION.

PATH *of the Vertex*, a term frequently uſed by Mr. Flamſtead, in his doctrine of the ſphere, for a circle deſcribed by any point of the earth's ſurface, as the earth turns round its axis.

The ſemi-diameter of this path is always equal to the ſine of the complement of the latitude of the point that deſcribes it.

PATHETIC, whatever relates to the paſſions, or that is proper to excite or awake them.

PATHETIC *Nerves*, in anatomy, a pair of very ſmall nerves which ariſe in the brain, and run to the trochlear muſcle of the eye. Theſe nerves have obtained the name pathetic, from their ſerving to move the eyes in the various paſſions.

PATHOGNOMONIC, ϖαθωγνομονικος, among phyſicians, an appellation for a ſymptom, or concourſe of ſymptoms, that are inſeparable from a diſtemper, and are found in that only, and no other.

PATHOLOGY, that part of medicine, which explains the nature of diſeaſes, their cauſes and ſymptoms.

PATHOS, ϖαθος; a Greek term, literally ſignifying paſſion, is ſometimes uſed for the energy of a diſcourſe, or its power to move the paſſions.

PATIENT, among phyſicians, a perſon under the direction of a phyſician or ſurgeon, in order to be cured of ſome diſeaſe.

PATANCE, in heraldry, is a croſs flory at the ends; from which it differs only in this, that the ends, inſtead of turning down like a fleur-de-lis, are extended ſomewhat in the pattee-form.

PATRICIAN, among the antient Romans, a title given to the deſcendants of the hundred, or, according to others, of the two hundred firſt ſenators choſen by Romulus, and by him called patres, fathers.

PATRIPASSIANS, *Patripaſſiani*, in church-hiſtory, a Chriſtian ſect, who appeared about the latter end of the IId century; ſo called from their aſcribing the paſſion to the father: for they aſſerted the unity of God in ſuch a manner as to deſtroy all diſtinction of perſons, and to make the Father and Son preciſely the ſame; in which they were followed by the Sabellians, and others. The author and head of the patripaſſians was Praxeas, a philoſopher of Phrygia in Aſia.

PATROL, in war, a round or march made by the guards, or watch, in the night-time, to obſerve what paſſes in the ſtreets, and to ſecure the peace and tranquility of a city or camp. The patrol generally conſiſts of a body of five or ſix men, detached from a body on guard, and commanded by a ſergeant.

PATRON, among the Romans, was an appellation given to a maſter who had freed his ſlave.

Patron was alſo a name which the people of Rome gave to ſome great man, under whoſe protection they uſually put themſelves.

PATRON, in the canon and common law, is a perſon, who having the advowſon of a parſonage, vicarage, or the like ſpiritual promotion, belonging to his manor, hath, on that account, the gift and diſpoſition of the benefice, and may preſent to it whenever it becomes vacant.

PATRONAGE, the right of diſpoſing of a church or benefice, and enjoying ſeveral other privileges, ſuch as having the honourable rights of the church, being interred in the chancel, &c.

PATRONYMIC, among grammarians, is applied to ſuch names of men or women as are derived from thoſe of parents or anceſtors.

PAVEMENT, a layer of ſtone, or other matter, ſerving to cover and ſtrengthen the ground of divers places for the more commodious walking on.

Moſaic PAVEMENT. See MOSAIC-WORK.

PAVETTA, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped; the tube is long, narrow, and cylindrical, with a patent border cut into four ſegments; the filaments are four, and very ſhort; theſe are topped with linear, ſpreading antheræ. The fruit is a roundiſh unilocular berry, containing a roundiſh cartilaginous ſeed.

PAVIA, the ſcarlet horſe cheſnut, in botany, a plant which grows to the height of eight or ten feet, having a thick woody ſtalk, from which proceeds ſeveral ſpreading branches; theſe are furniſhed with digitated leaves, compoſed of five or ſix ſpear-ſhaped lobes, which join at the footſtalk; they are of a light green, the ſurface rough and ſerrated on their edges; they have long footſtalks, and ſtand oppoſite by pairs: the flowers come out in July, in looſe ſpikes at the ends of the branches, ſtanding upon long naked footſtalks, which ſuſtain five or ſix flowers, which are tubulous at bottom, but ſpread open at top, where the petals are irregular in ſize and length, having the appearance of a labiated flower; they are of a bright red colour, and have ſeven or eight ſtamina the length of the petals: when the flowers fade, the germen ſwells to a pear-ſhaped fruit, with a thick ruſſet cover, having three cells, one of which, and ſometimes two, are pregnant with globular ſeeds.

This plant grows naturally in Carolina, and is propagated by ſowing its ſeeds, or by budding, or grafting it upon the common horſe-cheſnut.

PAVICULA, among the Romans, a rammer or inſtrument for beating down or levelling a ſpot of ground, conſiſting of a block of wood, a foot long and half a foot thick, with a long handle.

PAVILION, in architecture, ſignifies a kind of turret or building, uſually inſulated, and contained under a ſingle roof; ſometimes ſquare, and ſometimes in form of a dome: thus called from the reſemblance of its roof to a tent.

Pavilions are ſometimes alſo projecting pieces, in the front of a building, marking the middle thereof; ſometimes the pavilion flanks a corner, in which caſe it is called an angular pavilion. The Louvre is flanked with four pavilions: the pavilions are uſually higher than the reſt of the building. There are pavilions built in gardens, commonly called ſummer-houſes, pleaſure-houſes, &c. Some caſtles or forts conſiſt only of a ſingle pavilion.

PAVILION, in military affairs, ſignifies a tent raiſed on poſts, to lodge under in ſummer timer. See the article TENT.

PAVILION, in heraldry, denotes a covering in form of a tent, which inveſts or wraps up the armories of divers kings and ſovereigns, depending only on God and their ſword.

PAVILIONS, among jewellers, the underſides and corners of the brilliants, lying between the girdle and the collet.

PAULIONISTS, in church-hiſtory, Chriſtian heretics of the third century, diſciples of Paul Samoſatenſis, biſhop of Antioch, who denied Chriſt's divinity, maintaining that when we call him the Son of God, we do not thereby mean that he is really and truly God; but only that he was ſo perfect a man, and ſo ſuperior in virtue to all others, that he has this name given him by way of eminence. The paulioniſts continued to the Vth century, notwithſtanding the prohibition of the emperor Conſtantine the great, who forbad them and other heretics to hold public aſſemblies.

PAULICIANS, Chriſtian heretics of the VIIth century, diſciples of one Conſtantine, a native of Armenia, and a favourer of the errors of Manes; who, as the name Manichees was become odious to all nations, gave thoſe of his ſect the title of Paulicians, on pretence that they followed only the doctrine of St. Paul. One of their moſt deteſtable maxims was, not to give alms to the poor, that they might not contribute to the ſupport of creatures, who were the works of the bad god. See the article MANICHEES.

PAULLINIA, in botany, a genus of plants, the corolla of which conſiſts of four oval oblong petals, double the ſize of the cup, with two nectaria inſerted into the ungues of the petals; the ſtamina are eight ſhort filaments, topped with ſmall antheræ; the fruit is a large three cornered capſule, with three cells, each containing an ovate ſeed.

This genus includes the ſerjana, and cururu of Plumier.

PAUNCH, PANTCH, or PANCH, on board a ſhip, are broad clouts, woven of thrums and ſinnets together, to ſave things from galling and fretting; therefore they are made faſt to the main and fore-yards for that purpoſe.

PAVO, in aſtronomy, a ſouthern conſtellation, called the peacock.

PAUPER, in law. See the article FORMA PAUPERIS.

PAUSE, a ſtop or ceſſation of ſpeaking, ſinging, playing, or the like. The uſe of pointing in grammar, is to make proper pauſes in certain places. There is a pauſe in the middle of each verſe; in an hemiſtich it is called a reſt or repoſe.

PAUSE, in muſic, a character of ſilence or reſt, called alſo by ſome a mute figure; becauſe it ſhews that ſome part or perſon is to be ſilent while the reſt continue the ſong.

PAW, PATTE, in heraldry, the fore-foot of a beaſt, cut off ſhort. If the leg be cut off, it is called gambe. Lions-paws are much uſed in armory.

PEA, *Piſum*, in botany, a genus of plants, producing papilionaceous flowers; the vexillum is broad heart-ſhaped, reflexed, emarginated, and ending in a point; the alæ are roundiſh, connivent, and ſhorter than the vexillum; the carina is compreſſed, ſemilunulated, and ſhorter than the alæ; the fruit is a large, long, unilocular, and bivalve pod, containing ſeveral globoſe ſeeds. The ſtalks of the pea plant are long, hollow, and of a ſea green colour; the leaves are oblong, and of the ſame colour; and ſome are ſo placed that the ſtalks ſeem to run through them, while others grow by pairs on the ribs that are terminated by tendrils, which lay hold of every thing they meet with. There are ſeveral ſorts of peas, which are diſtinguiſhed by different names; as the golden-hot-ſpur, the Charlton-pea, the reading-maſter's and Eſſex hot-ſpurs, the dwarf-pea, the ſugar-pea, the Spaniſh-morotto, the nonpareil, the ſugar-dwarf, the ſickle-pea, the marrow-fat-pea, the roſe or crown-pea, the rouncival-pea, the grey-pea, &c. The propagation and uſe of peas, are ſo well known as to require no deſcription, they being common food in all parts of England; they are very nutritive but do not agree very well with weak ſtomachs.

Everlaſting-PEA. See EVERLASTING and LATHYRUS.

Sweet PEA. See the article LATHYRUS.

PEACE, *pax*, in its general ſignification, ſtands in contradiſtinction to war. See the article WAR.

PEACE, *of the king*, is that peace or ſecurity, both of life and goods, which the king promiſes to all his ſubjects, or others under his protection.

PEACH, *Perſica*, in botany, a genus of fruit-trees, claſſed by Linnæus, with the amygdalus or almond; but although they agree in their flowers and foliage there is a very conſiderable difference in their fruits; the almond having a thin, tough, coriaceous covering to the ſtone, which ſplits and falls away, leaving the ſtones naked; whereas the peach has a thick, moiſt, eſculent covering to its ſtone, which does not ſeparate; it may therefore be neceſſary in this work to mention them ſeparately. The peach tree is ſaid to be a native of Perſia; whoſe extreme parts (north and ſouth) differ about ten degrees of latitude, which difference is ſuppoſed to be the cauſe of their ſeveral kinds being ripe at divers ſeaſons: that is, it is imagined, that our early peaches, were natives of the northern, and our lateſt of the ſouthern parts.

This tree, in England, grows to a tolerable ſize; is generally trained againſt walls, &c. being too apt to miſcarry of its fruit when planted as a ſtandard; when grown old it has a pretty thick ſtem, with many brittle branches, and a rediſh and browniſh bark; the leaves are thin, oblong, acuminated, and for the moſt part crenated on their edges, having a bitter taſte; the flowers appear in the beginning of the ſpring before the leaves, and are without pedicles, for they adhere to the tubercles of the branches, and are roſaceous, conſiſting each of five oblong oval petals inſerted in the cup; they are of a light pink colour, and in the middle are many ſtamina; the flower is ſucceeded by a well known globular, furrowed fruit, covered with a thick ſoft whitiſh down. In England there are ſeveral ſorts or varieties cultivated, as. 1. The white nutmeg peach, this is ripe in July. 2. The red nutmeg, this ripens about the beginning of Auguſt. 3. The early purple, this is ripe by the middle of Auguſt. 4. The French mignon; this is a moſt excellent melting peach, and ripens about the middle of Auguſt. 5. The red magdalen; this peach is ripe about the end of Auguſt. 6. The early Newington ripens the end of Auguſt. 7. The nobleſt, this is a fine melting peach, and ripens the end of Auguſt. 8. The chancellor, a good melting peach, and ripens the end of Auguſt. 9. The admirable; this peach parts from the ſtone, and ripens the beginning of September. 10. The old Newington; this peach adheres to the ſtone, and is reckoned one of the beſt ſort. 11. The Portugal peach; this has a rich juice, and adheres to the ſtone, theſe ripen about the middle of September. 12. The nivette, this is a melter, and ripens in September. 13. The pavy of pomponne, is a very large fine peach, and ripens in October. 14. The Catherine, this adheres to the ſtone, is a high flavoured peach, and ripens in October: there are various other ſorts which might be enumerated but the abovementioned being of the beſt and richeſt flavour, we think it will ſuffice. The French diſtinguiſh thoſe we call peaches into two ſorts, viz. pavies, and peaches; thoſe are called peaches which ſeparate from the ſtone, and thoſe whoſe fleſh cloſely adheres to the ſtone are called pavies; theſe are much more eſteemed in France than the peaches, though in England the latter are preferred to the former by many perſons.

The beſt expoſiſtions for peach trees, are the ſouth, ſouth eaſt, and ſouth weſt, but they will do tolerably well on a weſt wall, which ripens its fruit juſt as thoſe of the ſouth are gone; they ſhould not be planted in a cold wet ſoil, the fruit in ſuch places are always watery, and inſipid; the beſt ſoil for theſe, is freſh untried earth, which is neither too ſtiff nor too moiſt, but of a kind loamy nature; and if the earth in the borders is exhauſted where the trees are intended to be planted, it ſhould be taken away, and its place ſupplied with freſh; all the ſorts of peaches are propagated by inoculation on plumb ſtocks, and trained in the nurſeries for planting againſt walls, &c. but it is certainly beſt to make choice of ſuch trees, which are of one years growth from the budding, as they will ſoon overtake in growth, thoſe which are called trained trees; the beſt time to tranſplant them is in autumn, when the leaves are turned yellow, when they will have time to form freſh roots, before winter, and thereby be better prepared to ſhoot more vigorous in the ſpring; but the head ſhould not be cut off at that time of planting; but if the ſoil is very moiſt, it is better to plant in the ſpring, juſt as the ſap begins to be in motion: in February the tops of the trees ſhould be cut off within four or five eyes of the place of inoculation; and when the weather becomes hot and dry, it may be neceſſary to water the trees: in May the young ſhoots will have made ſome progreſs; thoſe which have a fore-right direction, ſhould be diſplaced, and the others nailed horizontally to the wall; this muſt be repeated as often as it is neceſſary: in October, the branches ſhould be ſhortened in proportion to the ſtrengh of the tree, a vigorous branch may be left nine inches or a foot long, but if the ſhoots are weak, half that length is ſufficient; obſerving to train them horizontally, as the middle of the tree will eaſily furniſh itſelf with branches: the ſecond ſummer, they are to be managed as the firſt, diſplacing all fore-right ſhoots as they are produced, and nailing in the others cloſe to the wall horizontally; but the ſhoots ſhould not be ſhortened in the ſummer, unleſs in thoſe places where there happens to be vacancies: in October, ſhorten the ſhoots as before directed, and the following years management, is much the ſame as the preceding. The time for pruning is at the abovementioned time, where the trees are planted in a dry ſoil; but if the land is moiſt, it is better to defer it till the ſpring.

When peach trees haſten to bear very ſoon, it is a ſign of decay, or weakneſs, the beſt help for them is to diſburthen the tree of its bloom, pruning it ſhort, and keeping it well watered in hot weather; but when the trees are vigorous, cut out ſuch large branches as appear to be uſeleſs, and nail in the remainder at a good length; and in making choice of ſhoots, always chooſe the middling wood as are full of ſwelling double buds, for thoſe produce fruit, which the flat ſingle ones do not, their product being wood and leaves only; the diſtance theſe trees ſhould be planted, may be about ſixteen feet: when the fruit is ſet and grown to the bigneſs of a ſmall nut, they ſhould be thinned, leaving them at leaſt five or ſix inches aſunder, for when they are permitted to remain in bunches, as they are often produced, the nouriſhment which ſhould be employed wholly to the fruits deſigned to ſtand, will be equally ſpent amongſt the whole number, a great part of which muſt be afterwards pulled off, ſo that the ſooner this is done, the better it will be for the remainder; and if it ſhould ſometimes happen, that a part of thoſe left, by any accident ſhould be deſtroyed, yet the remaining ones will be much the larger, and better flavoured for it, and the trees will gain more ſtrength; for a moderate crop of fruit, is always preferable to a great crop; for when the trees are overcharged with fruit, it is always ſmall, ill taſted, and the trees are generally ſo much weakened thereby, as not to be in a condition for bearing well for two or three years afterward: the management, &c. of nectarines being the ſame as of peaches, a repitition is therefore unneceſſary.

PEACOCK, *Pavo*, in ornithology, a genus of birds, of the order of the gallinæ, the characters of which are theſe: there are four toes on each foot, and the head is ornamented with an erect creſt of feathers.

PEAN, in heraldry, is when the field of a coat of arms is ſable, and the powderings or.

PEAR, *Pyrus*, in botany, a genus of fruit-trees, whoſe flower conſiſts of five roundiſh concave petals, which are inſerted in the cup; the fruit is of a pyramidical form, containing five membranaceous cells, each containing a ſmooth, oblong, ovato ſeed, acuminated at the baſe, convex on one ſide and plane on the other.

Pear-trees, it is ſaid, were originally brought from Alexandria, Numidia, Greece, &c. as appears by the names of ſeveral ſorts. The fruit of ſome kinds ripens in the ſummer with us, and others are not fit for uſe until winter or the ſpring.

As the ſpecies are very numerous, we ſhall only mention a few of the beſt, viz. 1. the little muſk-pear, which ripens in July; 2. the jargonelle, this is one of the beſt ſummer-pears; 3. the Windſor-pear; 4. the blanquette-pear; 5. the red orange-pear; 6. the royal-pear; 7. the ſummer-boncretien; 8. the rouſſellet; 9. the princes-pear; 10. the ſummer-bergamot; 11. the autumn-bergamot; 12. the brown-beurré; 13. the monſieur John; 14. the flowered-muſcat; 15. the green ſugar-pear; 16. la marquiſe; 17. the craſſan; 18. the colmar; 19. the vert-longue; 20. the virgoulé; 21. the winter-thorn; 22. the St. Germain; 23. the winter-rouſſelet; 24. the Eaſter-bergamot; 25. the Hollands-bergamot; 26. the winter-boncretien; 27. the Chaumontelle. (The following are baking-pears) 28. the pound-pear, or black-pear of Worceſter; 29. the winter citron-pear; 30. the francreal; 31. the double flowering-pear, with many other ſorts: they are all propagated by budding or grafting upon ſtocks of their own kind (commonly called free-ſtocks) or upon quince-ſtocks; the latter are uſed for low walls, dwarfs, or eſpaliers; and eſpecially in wet lands, theſe ſtocks doth effectually prevent the too great luxurancy of the plant, and cauſe it to produce fruit much ſooner than on a pear ſtock; but then, on the other hand, it has this evil attending it, that the tree is but ſhort-lived, and moſt of the ſorts of hard baking-pears are rendered ſtony and good for little: on the contrary, moſt melting ſoft pears are greatly improved by being grafted on quince-ſtocks, particularly if the ſoil is of a moiſt ſtrong nature.

The beſt ſeaſons to prune pear-trees is at the fall of the leaf, though it may be deferred till the ſpring, obſerving to cut out all luxuriant branches, which are known by the great diſtance of their buds, and to lay in no more wood than the roots may be reaſonably ſuppoſed capable of ſupplying with ſufficient juices, leaving them at a diſtance from each other, in proportion to the ſize of the fruit; ſuch ſorts whoſe fruit are ſmall may be allowed five or ſix inches, but the larger ones muſt be not leſs than ſeven or eight inches aſunder, always remembring to train the branches horizontally as they are produced, without topping them, by which means there will be little occaſion for much pruning theſe trees; for it appears, that pear-trees have their bearing-buds in three different ſtates, continually ſucceeding each other; the blowing-buds of three years old diſcover themſelves at the fall of the leaf, which, whilſt the fruit preceding them was growing and ripening, they were preparing to ſucceed them the enſuing year: theſe buds are produced upon curſons or ſpurs, and are known by their being very full and larger than the others, in a ſeeming ſwelling impatient ſtate of breaking out into its beautiful dreſs of delightful bloom, which is enwrapped within it: the preparative buds of two years are of a ſharp conic figure, and red ruſſet colour, growing very near the fruitful buds before deſcribed: the junior buds of one year are very ſmall, but full above the bark, and always break out near the buds of two years growth; to which may be added, there is a continued ſucceſſion of buds in embryo, ad infinitum.

The diſtance pear-trees ſhould be planted, either againſt walls or eſpaliers, ſhould not be leſs than thirty feet, for if they have not room to ſpread on each ſide, it will be impoſſible to preſerve them in good order, eſpecially thoſe on free ſtocks, for the more theſe trees are pruned the more they will ſhoot: many ſorts of pears produce their bloſſom-buds at the extremity of the ſhoots, ſo that when they are ſhortened the fruit will be cut away, which cannot be avoided where the trees have not room allowed in their firſt planting.

The beſt ſeaſon for planting pear-trees in a dry ſoil is at autumn, but if the land be moiſt the ſpring is to be preferred.

Pears, in general, are windy, and improper for weak ſtomachs; however, thoſe are the beſt that are quite ripe and have a ſweet juice, and then they are ſeldom hurtful, unleſs they are eaten to exceſs.

PEARL, *Margarita*, in natural hiſtory, a hard, white, ſhining body, uſually roundiſh, found in a teſtacious fiſh reſembling an oyſter.

Pearls, though eſteemed of the number of gems by our jewellers, and highly valued, not only at this time, but in all ages, proceed only from a diſtemper in the creature that produces them, analogous to the bezoars, and other ſtony concretions in ſeveral animals of other kinds; and what the antients imagined to be a drop of dew concreted into a pearl in the body of the pear-fiſh, which they ſuppoſed roſe from the bottom to the ſurface of the water to receive it, is nothing more than the matter deſtined to form and enlarge the ſhell, burſting from the veſſels deſtined to carry it to the parts of the ſhell it would have formed, and by that means producing theſe little concretions.

The fiſh in which theſe are uſually produced is the Eaſt-Indian pearl-oyſter, as it is commonly, though not very properly, called: it has a very large and broad ſhell of the bivalve-kind, ſometimes meaſuring twelve or fourteen inches over, but thoſe of eight inches are more frequent: it is not very deep; on the outſide it is of a duſky brown, and within of a very beautiful white, with tinges of ſeveral other colours, as expoſed in different directions to the light. Beſides this ſhell, there are many others that are found to produce pearls; as the common oyſter, the muſcle, the pinna marina, and ſeveral others, the pearls of which are often very good, but thoſe of the true Indian berberi, or pearl-oyſter, are in general ſuperior to all. The ſmall or ſeed pearls, alſo called ounce pearls, from their being ſold by the ounce, and not by tale, are vaſtly the moſt numerous and common; but as in diamonds, among the multitudes of ſmall ones, there are ſmaller numbers of larger found, ſo in pearls there are larger and larger kinds; but as they increaſe in ſize, they are proportionably leſs frequent, and this is one reaſon of their great price.

Artificial PEARLS, are made by reducing ſeed-pearls to a paſte, by means of a chemical preparation called mercurial water, making the beads in ſilver moulds, boring them with a hog's briſtle, and drying them in a cloſed glaſs in the ſun.

Beads, in imitation of pearls, are alſo made of wax, and covered with the ſcales of ſeveral kinds of fiſhes.

Mother of PEARL, is the ſhell not of the pearl-oyſter, but of another ſea-fiſh of the oyſter-kind. This ſhell on the inſide is extremely ſmooth, and of the whiteneſs and water of pearl itſelf; and it has the ſame luſtre on the outſide, after the firſt laminæ or ſcales have been cleared off with aqua-fortis, and the lapidaries mill. Mother of pearl is uſed in inlaid works, and in ſeveral toys, as ſnuff-boxes, &c.

PEARL, in heraldry, in blazoning with precious ſtones, is the ſame with argent, or white.

PEARL, PIN, or WEB, in medicine, an excreſcence growing in the eye. See the article UNGUIS.

PEAT, a kind of turf uſed for fuel in ſeveral countries. See the article MOSS.

In Holland they have a way of charring peat, ſo that it may ſerve for fewel in ſeveral chemical operations; but this manner of charring is not yet known in ſeveral countries where, perhaps, peat might be found.

PEBBLES, *Calculi*, ſmall ſtones, compoſed of a cryſtalline matter debaſed by earths, and hence, ſubject to veins, clouds, and other variegations. See CRYSTAL.

PECCANT, in medicine, a term uſed for thoſe humours of the body which offend either by their quantity or quality.

PECK, a meaſure of capacity, four of which make a buſhel.

PECTIS, in botany, a genus of plants, whoſe common corolla is radiated, the proper corollulæ are hermaphrodite, and funnel-ſhaped: the female florets which form the rays, are ligulated, and ovate; the ſeeds, are contained in the cup, they are ſolitary, linear, and crowned with a bearded down.

PECTORAL, an epithet for medicines good for diſorders of the breaſt and lungs. The ordinary intention of theſe medicines is either to attenuate or thicken the humours of theſe parts, and to render them fit to be expectorated or ſpit out. See the article EXPECTORANTS.

PECTORALIS, in anatomy, a pair of muſcles which poſſeſſes almoſt the whole breaſt, and ſerves to move the arm forwards.

PECULIAR, in the canon law, ſignifies a particular pariſh or church that has juriſdiction within itſelf for granting probates of wills, and adminiſtrations, exempt from the ordinary or biſhop's courts.

Court of PECULIARS, is a court in which the affairs belonging to peculiars are tranſacted.

PECUNIARY, a term applied to the puniſhment of offenders by mulct or fine.

PEDAGOGUE, or PÆDAGOGUE, ϖαιδαγογος, a tutor or maſter to whom is committed the diſcipline and direction of a ſcholar, to be inſtructed in grammar and other arts.

PEDALIUM, in botany, a genus of plants, whoſe flower is monopetalous and ringent, the tube is trigonal, and the limb cut into five ſegments; the fruit is a reticulated nut, of a conico-tetragonal figure, containing two oblong ſeeds.

PEDALS, the largeſt pipes of an organ, ſo called becauſe played and ſtopped with the foot. The pedals are made ſquare, and of wood; they are uſually thirteen in number. They are of modern invention, and ſerve to carry the ſounds an octave deeper than the reſt. See ORGAN.

PEDANT, is uſed for a rough unpoliſhed man of letters, who makes an impertinent uſe of the ſciences, and abounds in unſeaſonable criticiſms and obſervations. Dacier defines a pedant, a perſon who has more reading than good ſenſe; and Malebranche deſcribes him, as a man full of falſe erudition, who makes a parade of his knowledge, and is ever quoting ſome Greek or Latin author, or hunting back to a remote etymology: hence,

PEDANTRY, the quality or manner of a pedant.

PEDESTAL, in architecture, the loweſt part of an order of columns, being that which ſuſtains the column, and ſerves it as a foot or ſtand. See COLUMN.

The pedeſtal conſiſts of three principal parts, viz. a ſquare, trunk, or dye, which makes the body; a corniche, the head; and a baſe, the foot of the pedeſtal. The pedeſtal is properly an appendage to a column, not an eſſential part of it; though M. Le Clerc thinks it eſſential to a complete order.

There are as many kinds of pedeſtals as there are of orders of columns, viz. the Tuſcan, Doric, Ionic, Corinthian, and Compoſite: ſome ſay that the height of the pedeſtal in each order, ought to be a third part of the whole column, comprehending the baſe and capital, and their proper adjuncts, as architrave, frieze, and corniche, a fourth part of the ſame pillar. Indeed Vignola, and moſt of the moderns, make the pedeſtal and all its ornaments in all the orders one third of the height of the column; including the baſe and capital; but ſome deviate from this rule. See the articles BASE, &c.

PEDESTALS, *of Statues*, are ſuch as ſerve to ſupport ſtatues or figures.

PEDICLE, among botaniſts, that part of a ſtalk which immediately ſuſtains the leaf of a flower or fruit, and is commonly called a foot-ſtalk.

PEDICULARIS, RED-RATTLE, or LOUSE-WORT, in botany, a genus of plants, whoſe flower is monopetalous and ringent; the tube is oblong and gibbous; the upper lip is helmet-ſhaped, erect, compreſſed, and emarginated; the under one is ſpreading, plane, ſemitrifid, and obtuſe; the fruit is an oblique, roundiſh, pointed capſule; with two cells, containing a number of roundiſh, compreſſed, covered ſeeds. This plant is of a cooling and drying nature, whence it is recommended in fiſtulas and other ſinous ulcers.

PEDILUVIUM, a bathing of the feet.

PEDIMENT, in architecture, is a kind of low pinnacle, ſerving to crown an ordonnance, or finiſh a frontiſpiece, and is placed as an ornament over gates, doors, windows, niches altars, &c. being ordinarily of a triangular form, but ſometimes forming an arch of a circle. The parts of a pediment are the tympanum and the corniche, which crowns it, and the entablature, which ſerves it as a baſe, or ſcale. Architects have taken a great deal of liberty in the form of this member; nor do they vary leſs as to the proportion of the pediment. The moſt beautiful, according to Daviler, is that where its height is about one fifth of the length of its baſe.

The pediment is uſually triangular, and ſometimes an equilateral triangle, called alſo a pointed pediment; it is ſometimes circular, though M. Felibien obſerves, that we have no inſtance of round pediments in the antique, beſides thoſe in the chapels of the rotundo. Sometimes its upper corniche is divided into three or four ſides, or right lines: ſometimes the corniche is cut or open at top, which is an abuſe introduced by the moderns, particularly Michael Angelo; for the deſign of this part over doors, windows, &c. being chiefly to ſhelter thoſe underneath from the rain, to leave it open in the middle is to fruſtrate its end. Sometimes the pediment is formed of a couple of ſcrolls or wreaths, like two conſoles joined together; ſometimes again it is without a baſe, or its lower corniche is cut out, all but what is beſtowed on two columns or pilaſters, and on theſe is raiſed an arch or ſweep, inſtead of an entablature, of which Serlio gives an inſtance in the antique in a Corinthian gate at Foligny, in Umbria; and Daviler a modern one in the church of St. Peter at Rome.

Under this kind of pediments come thoſe little arched corniches, which form pediments over doors and windows, ſupported by two conſoles, inſtead either of entablature or columns.

Sometimes the pediment is made double, *i. e.* a leſs pediment is made in the tympanum of a larger, on account of ſome projecture in the middle, as the frontiſpiece of the church of the great Jeſus at Rome; but this is accounted an abuſe in architecture, though authoriſed by very good buildings, as the large pavillion of the Louvre, where the caryatides ſupport three pediments one in another: ſometimes the tympanum of the pediment is cut out, or left open to let in light, as is ſeen under the portico of the capitol at Rome; laſtly, this open pediment is ſometimes triangular, and enriched with ſculpture, as roſes, leaves, &c. as is found in moſt of the Gothic churches.

M. Le Clerc obſerves, that the modillions in the corniche of the pediment ſhould always anſwer exactly over thoſe of the entablature. Indeed Vitruvius ſays, that the ancients did not allow of any modillions at all in pediments. M. Le Clerc alſo obſerves, that the corniche which ſerves the pediment as a baſe, ſhould have no cymatium, by reaſon the cymatium of the reſt of the entablature, when it meets the pediment, paſſes over it. This change of determination occaſions a conſiderable difficulty; the cymatium in this caſe appearing too broad in the turn of the angle, to remedy which, architects have recourſe to ſeveral expedients.

A pointed pediment may crown three arches, but a circular pediment can only crown agreeably. There ſhould never be uſed more than two tympana over each other in the ſame frontiſpiece, and even where there are two, it would be proper to have the lower circular, and the upper pointed.

PEDRERO, PETERERO, or PATERERO, a ſmall piece of ordnance, uſed on board ſhips, for the diſcharging of nails, broken iron, or partridge ſhot, on an enemy attempting to board. See ORDNANCE.

They are generally open at the breech, and their chamber made to take out, to be loaded that way, inſtead of at the muzzle.

PEDUNCLE, among botaniſts, denotes a partial trunk, or foot-ſtalk, of a flower, raiſing the fructification, but not the leaves: the determination of peduncles reſpects place and manner; with regard to place they are ſaid to be radical when they come out of the root; cauline when they are placed on the ſtem; rameous when they come out upon the branches; axillary when they proceed from between the leaf and ſtem; terminal when they terminate the branches or ſtem; ſolitary when there comes but one from the ſame place. With reſpect to manner there are either uniflorous, biflorous, triflorous, or multiflorous peduncles, and are ſuch as bear one, two, three, or many flowers on each.

PEE, in mining, is uſed for the place where two veins meet and croſs one another.

PEER, in general, ſignifies an equal, or one of the ſame rank and ſtation: hence in the acts of ſome councils we find, theſe words with the conſent of our peers, biſhops, abbots, &c. Afterwards the ſame term was applied to the vaſſals or tenants of the ſame lord who were called peers, becauſe they were all equal in condition, and obliged to ſerve and attend him in his courts; and peers in fiefs, becauſe they all held fiefs of the ſame lord.

The term peers is now applied to thoſe who are impannelled in an inqueſt upon a perſon for convicting or acquitting him of any offence laid to his charge; and the reaſon why the jury is ſo called, is, becauſe by the common law, and the cuſtom of this kingdom, every perſon is to be tried by his peers or equals, a lord by the lords, and a commoner by commoners.

PEER *of the Realm*, a noble lord who has a ſeat and vote in the houſe of lords, which is alſo called the houſe of peers.

PEERESS, a woman who is noble by deſcent, creation, or marriage.

If a peereſs, by deſcent or creation, marries a perſon under the degree of nobility, ſhe ſtill continues noble: but if ſhe obtains that dignity only by marriage, ſhe loſes it, on her afterwards marrying a commoner; yet, by the curteſy of England, ſhe always retains the title of her nobility. No peereſs can be arreſted for debt or treſpaſs; for though, on account of their ſex, peereſſes cannot ſit in the houſe of lords, yet they enjoy the privileges of peers, and therefore all peereſſes by birth, are to be tried by their peers.

PEGANUM, wild rue, in botany, a genus of plants, whoſe flower conſiſts of five oblong oval petals, with fifteen ſubulated filaments, topped with oblong erect antheræ. The fruit is a roundiſh, three-cornered capſule, with three cells, containing many ovate acuminated ſeeds.

PEGASUS, in aſtronomy, a conſtellation of the northern hemiſphere, in form of a flying horſe, ſaid by different authors to contain 19, 20, and 93 ſtars.

PELAGIANS, a Chriſtian ſect who appeared about the latter end of the fourth, or the beginning of the fifth century.

Pelagius, the author of this ſect, was born in Wales, and his name was Morgan, which in the Welch language ſignifies ſea-born; from whence he had his Latin name Pelagius. Some of our antient hiſtorians pretend that he was abbot of Bangor; but this is impoſſible, becauſe the Britiſh monaſteries were of a later date. St. Auſtin gives him the character of a very pious man, and a Chriſtian of no vulgar rank: according to the ſame father, he travelled to Rome, where he aſſociated himſelf with perſons of the greateſt learning and figure, and wrote his commentaries on St. Paul's Epiſtles, and his letters to Melania and Demetrias; but being charged with hereſy, he left Rome, and went into Africa, and from thence to Jeruſalem, where he ſettled. He died ſomewhere in the Eaſt, but where is uncertain. He was charged with maintaining the following doctrines: 1. That Adam was by nature mortal, and whether he had ſinned or not, would certainly have died. 2. That the conſequences of Adam's ſin were confined to his own perſon. 3. That new-born infants are in the ſame condition with Adam before the fall. 4. That the law qualified men for the kingdom of heaven, and was founded upon equal promiſes with the Goſpel. 5. That the general reſurrection of the dead does not follow in virtue of our Saviour's reſurrection. 6. That the grace of God is given according to our merits. 7. That this grace is not granted for the performance of every moral act; the liberty of the will, and information in points of duty being ſufficient, &c. Pelagius's ſentiments were condemned by ſeveral councils in Africa, and by a ſynod at Antioch.

There was alſo a ſect of Semi-Pelagians; who, with the orthodox, allowed of original ſin; but denied that the liberty of the will could be ſo far impaired thereby, that men could not of themſelves do ſomething, which might induce God to afford his grace to one more than another: and as to election, they held, that it depended on our perſeverance; God chooſing only ſuch to eternal life, as continued ſtedfaſt in the faith.

PELECINUS, a plant, otherwiſe called biſerrula. See the article BISERRULA.

PELICAN, *Pelicanus*, in ornithology, a genus of birds, of the order of the anſeres, the beak of which is very long, crooked, and unguiculated at the extremity: its ſides are not denticulated, and the anterior part of the head towards the throat is naked.

PELICAN, in chemiſtry, a kind of double glaſs veſſel, uſed in diſtilling liquors by circulation: it conſiſts of a cucurbit and alembic-head, with two tubes bending into the cucurbit again.

PELLETS, in heraldry, thoſe roundles that are black, called alſo ogreſſes and gun-ſtones, and by the French torteaux de ſable.

PELLICLE, among phyſicians, &c. denotes a thin film, or fragment of a membrane.

When any liquor is evaporated in a gentle heat, till a pellicle ariſe at top, it is called an evaporation to a pellicle; wherein there is juſt liquor enough left to keep the ſalts in fuſion.

PELLITORY, *Parietaria*, in botany. See the article PARIETARIA.

PELLUCID, the ſame with diaphanous, or tranſparent. See the article TRANSPARENT.

PELVIS, in anatomy, the lower part of the cavity of the abdomen, thus called from its reſemblance to a baſon, or ewer, in Latin called pelvis. It is formed by the oſſa ilia and iſchia, the os ſacrum, the os coccygis, and the oſſa pubis. See the article OSSA INNOMINATA.

The pelvis is much larger in women than in men, to give room for the growth, &c. of the fœtus.

PELVIS *of the Kidneys*, is a membranaceous cavity in the kidneys, which ſends out ſeveral proceſſes called the tubuli of the pelvis, and ſurrounds the renal papillæ.

PEN, or PENSTOCK. See PENSTOCK.

PENANCE, a puniſhment, either voluntary or impoſed by authority, for the faults a perſon has committed.

PENÆA, in botany, a genus of plants, whoſe flowers are monopetalous and campanulated, with the border cut into four ſegments; it hath four ſtamina; and the fruit is a tetragonal capſule, having four cells, each containing two oblong obtuſe ſeeds.

PENCIL, an inſtrument uſed by painters for laying on their colours. Pencils are of various kinds, and made of various materials; the larger ſorts are made of boars-briſtles, the thick ends of which are bound to a ſtick, bigger or leſs, according to the uſes they are deſigned for: theſe, when large, are called bruſhes. The finer ſorts of pencils are made of camels, badgers, and ſquirrels-hair, and of the down of ſwans; theſe are tied at the upper-end with a piece of ſtrong thread, and incloſed in the barrel of a quill.

All good pencils, on being drawn between the lips, come to a fine point.

PENDANT, an ornament hanging at the ear, frequently conſiſting of diamonds, pearls, and other precious ſtones.

PENDANTS, in heraldry, parts hanging down from the label, to the number of three, four, five, or ſix at moſt, reſembling the drops in the Doric frieze. When they are more than three, they muſt be ſpecified in blazoning.

PENDANTS, of a ſhip, are thoſe ſtreamers or long colours which are ſplit and divided into two parts ending in points, and hung at the head of maſts, or at the yard-arm ends.

PENDANT-*Feathers*, with falconers, are thoſe feathers that grow behind the thighs of an hawk.

PENDANTS, among floriſts, the ſame with apices or antheræ. See ANTHERÆ and STAMINA.

PENDENTIVE, in architecture, the whole body of a vault ſuſpended out of the perpendicular of the walls, and bearing againſt the arch-boutants: or according to Daviler, it is the portion of a vault between the arches of a dome, uſually inriched with ſculpture.

The pendentives are generally of brick or ſoft ſtone; but care is to be taken, that the couches, or beds of maſonry, be always laid level, and in right lines proceeding from the ſweep whence the riſe was taken: the joints too muſt be made as ſmall as poſſible, to ſave the neceſſity of filling them up with wood, or of uſing much mortar.

PENDULOUS, a term applied to any thing that bends or hangs downwards; thus, the flowers, whoſe ſlender ſtalks are not able to ſuſtain their heads upright, are called pendulous flowers.

PENDULUM, in mechanics, denotes any heavy body, ſo ſuſpended as that it may vibrate, or ſwing, backwards and forwards, about ſome fixed point, by the force of gravity. See the article GRAVITY.

The vibrations of a pendulum are called its oſcillations. See the article OSCILLATION.

A pendulum, therefore, is any body, B, (plate LXXIII. *fig.* 1.) ſuſpended upon and moving about a fixed point, A, as a center.

The nature of a pendulum conſiſts in the following particulars: 1. The times of the vibrations of a pendulum, in very ſmall arches, are all equal. 2. The velocity of the bob, in the loweſt point, will be nearly as the length of the chord of the arch which it deſcribes in the deſcent. 3. The times of vibration in different pendulums, AB, AC, are as the ſquare roots of the times of their vibrations. 4. The time of one vibration is to the time of the deſcent, through half the length of the pendulum, as the circumference of a circle to its diameter. 5. Whence the length of a pendulum, vibrating ſeconds, will be found 39.2 inches nearly; and that of a half ſecond pendulum 9.8 inches. 6. An uniform homogeneous body, BG, (*fig.* 2.) as a rod, ſtaff, &c. which is one-third part longer than a pendulum, AD, will vibrate in the ſame time with it.

From theſe properties of the pendulum we may diſcern its uſe as an univerſal chronometer, or regulator of time, as it is uſed in clocks, and ſuch like machines.

By this inſtrument alſo we can meaſure the diſtance of a ſhip, by meaſuring the interval of time between the fire and the ſound of a gun; alſo the diſtance of a cloud, by numbering the ſeconds, or half-ſeconds, between the lightning and thunder. Thus, ſuppoſe between the lightning and thunder, we number 10 ſeconds, then (becauſe ſound paſſes through 1142 feet in one ſecond) we have the diſtance of the cloud equal to 11420 feet.

Again, the height of any room, or other object, may be meaſured by a pendulum vibrating from the top thereof. Thus, ſuppoſe a pendulum from the height of a room vibrates once in three ſeconds; then ſay, as 1 is to the ſquare of 3. viz. 9, ſo is 39.2 to 352.8 feet, the height required. Laſtly, by the pendulum we diſcover the different force of gravity on diverſe parts of the earth's ſurface, and thence the true figure of the earth. See the article EARTH.

When pendulums were firſt applied to clocks, they were made very ſhort; and, the arches of the circle being large, the time of vibration, through different arches, could not in that caſe be equal; to effect which, the pendulum was contrived to vibrate in the arch of a cycloid, by making it play between two ſemi-cycloids, CB, CD, (*fig.* 3.) whereby it deſcribes the cycloid BEAD; the property of which curve is, that a body vibrating in it, will deſcribe all its arches, great or ſmall, in equal times.

In all that has been hitherto ſaid, the power of gravity has been ſuppoſed conſtantly the ſame. But, if the ſaid power varies, the lengths of pendulums muſt vary in the ſame proportion, in order that they may vibrate in equal times; for we have ſhewn, that the ratio of the times of vibration and deſcent through half the lengths is given, and conſequently the times of vibration and deſcent through the whole length is given: but the times of vibrations are ſuppoſed equal, therefore the times of deſcent through the lengths of the pendulum are equal. But bodies deſcending through unequal ſpaces, in equal times, are impelled by powers that are as the ſpaces deſcribed, that is, the powers of gravity are as the lengths of the pendulums.

The greateſt inconvenience attending this moſt uſeful inſtrument is, that it is conſtantly liable to an alteration of its length, from the effects of heat and cold, which very ſenſibly expand and contract all metalline bodies. See the article HEAT.

To remedy this inconvenience, the common method is by applying the bob of the pendulum with a ſcrew, ſo that it may at any time be made longer or ſhorter, according as the bob is ſcrewed upwards or downwards, and thereby the times of its vibrations kept always the ſame.

Again, if a glaſs or metalline tube, uniform throughout, filled with quick-ſilver, and 58.8 inches long, were applied to a clock, it would vibrate ſeconds for $39.2 = \frac{2}{3}$ of 58.8, and ſuch a pendulum admits of a twofold expanſion and contraction, viz. one of the metal and the other of the mercury, and theſe will be at the ſame time contrary, and therefore will correct each other. For, by what we have ſhewn, the metal will extend in length with heat, and ſo the pendulum will vibrate ſlower on that account. The mercury alſo will expand with heat, and ſince by this expanſion it muſt extend the length of the column upward, and conſequently raiſe the center of oſcillation; ſo that, by this means, its diſtance from the point of ſuſpenſion will be ſhortened, and therefore the pendulum on this account will vibrate quicker: wherefore, if the circumſtances of the tube and mercury are ſkilfully adjuſted, the time of the clock might, by this means, for a long courſe of time, continue the ſame, without any ſenſible gain or loſs.

This is the invention of the late ingenious Mr. Graham, in the year 1721, who made a clock of this ſort, and compared it with one of the beſt of the common ſort for three years together, and found the errors of the former but about $\frac{1}{8}$ part of the latter; of which the reader may ſee a farther account in the Philoſophical Tranſactions, N°. 392. It is what is now called Mr. Graham's quickſilver-pendulum.

In the forty-ſeventh volume of the Philoſophical Tranſactions, Mr. Short gives us an account of other inventions to remedy the ſame inconvenience. Mr. John Harriſon, of Barrow, in Lincolnſhire, famous for his invention of a clock to find the difference of longitude at ſea, without having the leaſt knowledge of what Mr. Graham had done before him, made ſeveral experiments upon wires of different metals, in order to find their different degrees of expanſion and contraction. He thought, that by a proper combination of wires, of two different metals, differing conſiderably in their expanſion and contraction, he might be enabled to keep the center of oſcillation of a pendulum always at the ſame diſtance from the point of ſuſpenſion.

In conſequence of theſe experiments, he made a pendulum conſiſting of one ſteel wire, at the end of which is the bob or weight; and on each ſide of this wire, four wires alternately braſs and ſteel, ſo diſpoſed and contrived as to raiſe the pendulum by the ſame quantity that it is lengthened by heat, and to let down the pendulum in the ſame proportion as it is raiſed by cold.

Mr. Harriſon, in his firſt machine for meaſuring time at ſea, likewiſe applied this combination of wires of braſs and ſteel, to prevent any alterations by heat and cold. And in the two machines or clocks he has ſince made for the ſame purpoſe, a like method of guarding againſt the irregularities ariſing from this cauſe is uſed.

Mr. Graham alſo made a pendulum conſiſting of three bars, one of ſteel between two of braſs, and the ſteel bar acted upon a lever, ſo as to raiſe the pendulum, when lengthened by heat, and to let it down when ſhortened by cold; but he found this clock liable to ſudden ſtarts and jerks in its motion.

The ingenious Mr. Ellicott, in the ſame volume of the Tranſactions, deſcribes a pendulum of his invention, compoſed of braſs and iron, with the method of applying it, ſo as to avoid the many jerks to which the machine might be liable.

But beſides the irregularities ariſing from heat and cold, pendulum-clocks are liable to others from friction and foulneſs; to obviate which, Mr. Harriſon has ſeveral excellent contrivances, whereby his clocks are almoſt entirely free from friction, and never need be cleaned. See the article Friction.

PENETRATION, *Penetratio*, the act whereby one thing acts upon another, or takes up the place already poſſeſſed by another.

PENGUIN, in ornithology, a name given to a ſpecies of the alca, with eight furrows on the beak, and a white ſpot before the eye. It is a very large and ſingular bird, equal to the common gooſe in ſize; the head is large, and flatted on the crown; the eyes are pretty large, and their iris grey with a tinge of yellow: the beak is of a kind of triangular figure, compreſſed at the ſides, and a little hooked juſt at the extremity: the wings and tail are ſhort, the feet ſtand backward, and the toes are connected by a membrane.

PENINSULA, in geography, a portion or extent of land, joining to the continent by a narrow neck, or iſthmus; the reſt being encompaſſed with water.

PENIS, the yard, in anatomy, the primary organ of generation in man; being called alſo mentula, virgo, priapus, and by a multitude of other names.

PENITENCE, *Penitentia*, properly ſignifies the ſame with repentance; but is alſo uſed for the diſcipline, or puniſhment, more uſually called penance.

PENITENTS, an appellation given to certain fraternities of penitents, diſtinguiſhed by the different ſhape and colour of their habit.

PENNON, or Penon, a kind of ſtandard, with a long tail, anciently belonging to a ſimple gentleman. It is oppoſed to the banner, which was ſquare.

PENNY, an ancient ſilver-coin, which, though now little uſed, was the only one current among our Saxon anceſtors. See the article Coin.

Penny-Earth, in agriculture, denotes a hard, loamy, or ſandy earth, with a large proportion of ſea-ſhells intermixed with it.

Penny-Royal, *Pulegium*, in botany, a plant having a perennial, creeping, fibrous root, with ſquare ſtalks, ſome of which grow upright, and others creep on the ground, putting out roots at every joint, whereby it ſpreads and propagates very faſt; the leaves are oval, and come out from the joints of the ſtalks in pairs, oppoſite; their ſmell is agreeable, but ſtrong, and the taſte is hot: the flowers proceed from juſt above the leaves at each joint, and are diſpoſed in whorles; they are of a pale purple, ſmall, and helmet-ſhaped on the upper lip, but cut into three unequal ſegments on the lower one; they are ſucceeded by four ſmall ſeeds, placed in the bottom of the cup. It flowers in July and Auguſt, at which time it ſhould be gathered for uſe.

This plant is of a very ſubtile and penetrating nature, and is therefore aperitive, diſcutient, and carminitive; it is an excellent pectoral, and given with great ſucceſs in aſthmas, and all difficulties of breathing; ſome likewiſe recommend its application outwardly, in pains of the head; a diſtilled water of this plant, and alſo an oil, is kept in the ſhops for medicinal uſes.

This plant is held as a ſpecies of mentha, or mint, by Tournefort and Linnæus.

Penny-weight, a troy-weight, containing twenty-four grains, each of which is equal in weight to a grain of wheat, gathered out of the middle of the ear, and well dried. See Weight.

PENSION, a ſum of money paid annually for ſervices or conſiderations already paſt.

PENSIONARY, or Pensioner, a perſon who has an appointment, or yearly ſum, payable during life, by way of acknowledgment, charged on the eſtate of a prince, company, or particuler perſon.

Grand Pensionary, an appellation given to the firſt miniſter of the ſtates of Holland.

Pensionary, is alſo the firſt miniſter of the regency of each city in Holland.

PENSIONER, in general, denotes a perſon who receives a penſion, yearly ſallary, or allowance.

PENTSTOCK, a ſluice, or flood-gate, ſerving to retain or let go, at pleaſure, the water of a mill-pond, or the like. See the article Sluice.

PENTACHORD, an antient muſical inſtrument, with five ſtrings, whence the name.

The ſtrings were of bullocks leather, and ſtruck with a plectrum made of goats-horn.

PENTACROSTIC, in poetry, a ſet of verſes ſo diſpoſed as that there are always five acroſtics of the ſame name, in five diviſions of each verſe. See the article Acrostic.

PENTAGON, in geometry, a figure of five ſides and five angles.

In fortification, pentagon denotes a fort with five baſtions.

PENTRAGRAPH, or Parallelogram, an inſtrument whereby deſigns of any kind may be copied in what proportion you pleaſe, without being ſkilled in drawing.

PENTAMETER, in antient poetry, a kind of verſe conſiſting of five feet, or metres; whence the name.

The two firſt feet may be either dactyls or ſpondees, at pleaſure; the third is always a ſpondee, and the two laſt anapeſts.

PENTANDRIA, the name of the fifth claſs in the Linnæan ſyſtem of botany; it comprehends all thoſe plants whoſe flowers are hermaphrodite; each containing five ſtamina, or male parts of generation. To this claſs belong the vine, gooſberry, curran, primroſe, borage, nightſhade, flax, with many other genera.

PENTAPETALOUS, an appellation given to flowers that conſiſt of five petals or leaves.

PENTAPETES, in botany, a genus of plants, whoſe flower hath five oblong patent petals, and fifteen linear ſtamina, joined in a tube at their baſe, five of which are larger, coloured, and caſtrated; the antheræ of the others are oblong and erect: the fruit is an ovate ligneous capſule, with five cells, containing a number of oblong compreſſed ſeeds.

There is but one known ſpecies belonging to this genus, which is a native of India; the flowers are of a fine ſcarlet, and with us they blow from July to September, in ſucceſſion: the whole plant is annual, and raiſed from ſeeds on a hot-bed in the ſpring.

PENTASTICH, πενταςιχον, in poetry, a ſtanza, or diviſion of a poem, conſiſting of five verſes; whence the name

PENTASTYLE, in architecture, a building wherein there are five rows of columns. See the article Column.

PENTATEUCH, πεντατευχος, an appellation given to the firſt five books of the Old Teſtament, viz. Geneſis, Exodus, Leviticus, Numbers, Deuteronomy.

PENTECOST, a ſolemn feſtival of the Jews, ſo called becauſe it was celebrated on the fiftieth day after the ſixteenth of the month Niſan, which was the ſecond day of the paſſover.

The feaſt of pentecoſt was inſtituted in memory of the law's being given, on the fiftieth day after the Iſraelites came out of Egypt.

It was on the feaſt of pentecoſt that the Holy Ghoſt miraculouſly deſcended on the apoſtles. See Whitsunday.

PENTHEMIMERIS, in antient poetry, a part of a verſe conſiſting of two feet and a long ſyllable.

PENTHORUM, in botany, a genus of plants whoſe flower hath ſometimes no petals, but often five, which are linear, ſmall, and placed in the edge of the cup; the ſtamina are ten ſetaceous perſiſtent filaments, topped with roundiſh deciduous antheræ; the fruit is a quinquefid capſule, containing a great many very ſmall ſeeds.

PENULTIMA, or Penultimate Syllable, in grammar, denotes the laſt ſyllable but one of a word; and hence the anti-penultimate ſyllable is the laſt but two, or that immediately before the penultima.

PENUMBRA, in aſtronomy, a partial ſhade obſerved between the perfect ſhadow and the full light in an eclipſe.

It ariſes from the magnitude of the ſun's body; for were he only a luminous point, the ſhadow would be all perfect: but by reaſon of the diameter of the ſun, it happens that a place which is not illuminated by the whole body of the ſun, does yet receive rays from a part thereof. See the article ECLIPSE.

PEONY, in botany, ſee PÆONIA.

PEPASMUS, in medicine, denotes the digeſting and concocting of morbid humours.

PEPASTIC, or PEPTIC, in phyſic, are medicaments of the conſiſtence of an emplaiſter, for bringing humours to a head, and diſpoſing them to maturation.

PELPIS, water purſlain, in botany, a genus of plants, whoſe flower hath ſix ovate very ſmall petals, with ſix ſhort ſtamina: the fruit is a hard ſhaped capſule with two cells, containing a number of ſmall three-cornered ſeeds.

PEPO, the POMPION, in botany, is comprehended by Linnæus among the cucurbita. See the article CUCURBITA.

PEPPER, Piper, in botany, a ſhrub, whoſe root is ſmall, fibrous, tough, and blackiſh, from which ariſes many ſhoots that are tough, flexible, green, and woody, laying on the ground, unleſs propped up; they have ſeveral knots or joints, at each of which the leaves are alternately diſpoſed; theſe are of a roundiſh form, two or three inches broad, and four long, terminating in points; the texture is thick and firm, and on the upper part they are of a ſhining duſky green, but beneath of a light green, and have ſhort thick pedicles: the flowers grow in ſpikes, cloſely covered, with very ſmall apetalous flowers without filaments; the antheræ are two in number, of a roundiſh form, and oppoſite to the root of the germen, which is large and oval, and crowned with a triple prickly ſtigma: the fruit is a roundiſh unilocular berry, containing one globoſe ſeed, which is green at firſt, and red when ripe, but in drying they grow black and wrinkled. It comes from Malabar, Java, Sumatra, and other parts of the Eaſt-Indies. This kind of pepper is of common and general uſe, and is every where employed as a ſpice to create an appetite, and help digeſtion.

Another ſort of pepper, called Long Pepper, is an upright dried fruit, about an inch or an inch and a half long; it is oblong, round, cylindraceous, and, as it were, ſtreaked with ſpiral lines, with tubercles placed in the form of a net; within it is divided into ſeveral ſmall cells, containing each a ſmall round ſeed, blackiſh without, but whitiſh within, with an acrid, hot, bitteriſh taſte: long pepper is commonly pickled, and is in high eſteem among ſome. It is very good for cold, phlegmatic conſtitutions.

When the rind of black pepper is taken off it appears white, and is the only ſort brought to us by the name of white pepper, though ſome botanical authors give us an account of a ſpecies, whoſe fruit is naturally white, however, there is ſaid to be no difference between the plants that produce them, except in the colour of the fruit: it is now very rare, and only to be found in certain places of Malabar and Malacca. They have all much the ſame virtues, for they heat, dry, attenuate, reſolve, open and ſtrengthen relaxed fibres of the viſcera, and by exciting an oſcillation therein, refreſh the ſpirits, divide groſs humours, and encreaſe the circulation of the blood. In the Eaſt-Indies they have a way of preſerving the common and long pepper in vinegar, and eating them afterwards at meals.

Jamaica PEPPER, *Pimenta*, in botany. See the article PIMENTA.

Water-PEPPER, in botany. See the article POLYGONUM.

PEPPER-MINT, in botany. See the article MINT.

PERAMBULATOR, in ſurveying, an inſtrument for meaſuring diſtances, called alſo pedometer, way-wiſer, and ſurveying-wheel.

It conſiſts of a wheel, A A, (plate LXXIII. *fig.* 4.) two feet ſeven inches and a half in diameter; conſequently, half a pole, or eight feet three inches in circumference. On one end of the axis is a nut, three quarters of an inch in diameter, and divided into eight teeth; which, upon moving the wheel round, fall into the teeth of another nut *c* (*fig.* 5.) fixed on one end of an iron rod Q, and thus turns the rod once round, in the time the wheel makes one revolution. This rod, lying along a groove in the ſide of the carriage of the inſtrument, under the dotted line, has at its other end a ſquare hole, into which is fitted the end *b* of a ſmall cylinder P. This cylinder is diſpoſed (*fig.* 6.) under the dial-plate of a movement, at the end of the carriage B, in ſuch a manner as to be moveable about its axis; its end *a* is cut into a perpetual ſcrew, which falling into the thirty two teeth of a wheel perpendicular thereto, upon driving the inſtrument forward, that wheel makes a revolution each ſixteenth pole. On the axis of this wheel is a pinion with ſix teeth, which, falling into the teeth of another wheel of ſixty teeth, carries it round every hundred and ſixtieth pole, or half a mile.

This laſt wheel, carrying a hand or index round with it over the diviſions of a dial-plate, whoſe outer limb is divided into one hundred and ſixty parts, correſponding to the one hundred and ſixty poles, points out the number of poles paſſed over. Again, on the axis of this laſt wheel is a pinion, containing twenty teeth, which, falling into the

Fig.1. Pendulum.

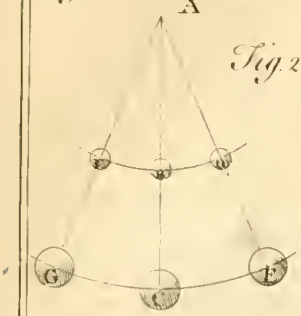


Fig.2.

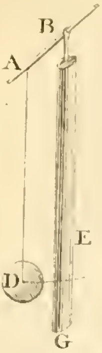


Fig.4. Perambulator.

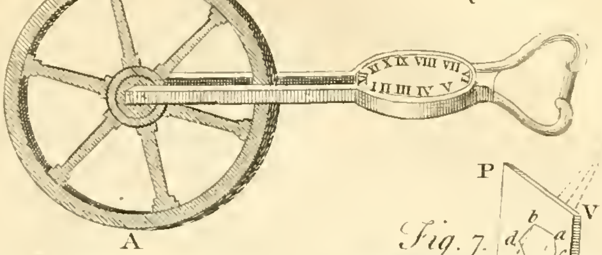


Fig.5.

Fig.6.

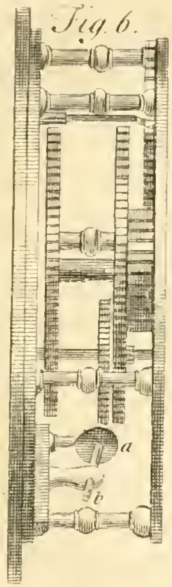


Fig.10.

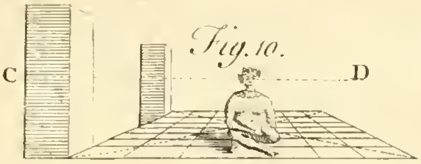


Fig.7.

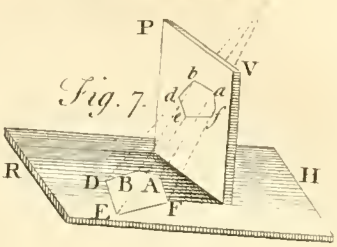


Fig.11. A Cluster Polype.

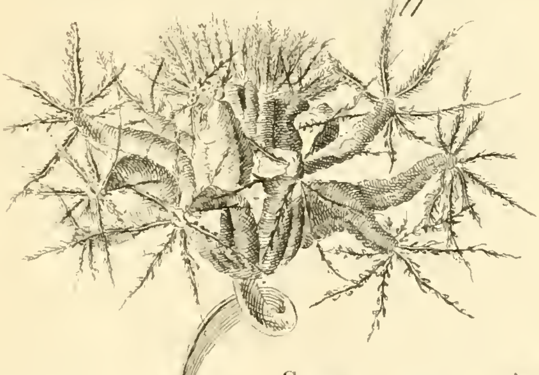


Fig.12.

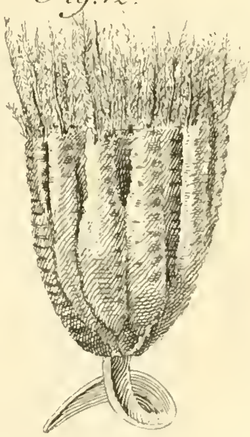


Fig.13. Precession.

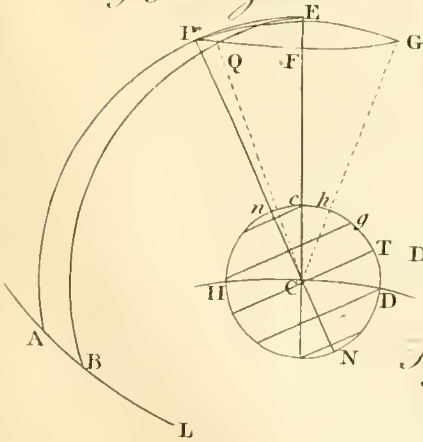


Fig.9.

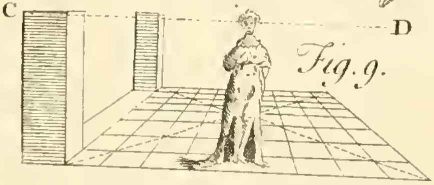


Fig.3. Pendulum.

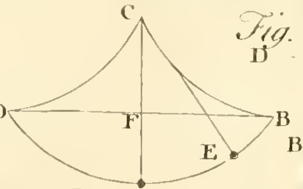
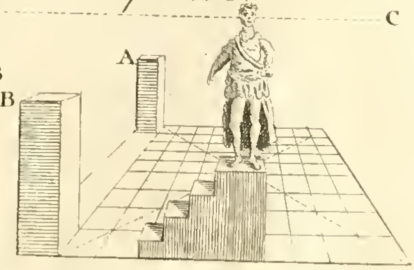


Fig.8. Perspective.



teeth of a third wheel, which hath forty teeth, drives it once round in three hundred and twenty poles, or a mile. On the axis of this wheel is a pinion of twelve teeth, which, falling into the teeth of a fourth wheel, having ſeventy-two teeth, drives it once round in twelve miles.

This fourth wheel, carrying another index over the inner limb of the dial-plate, divided into twelve for miles, and each mile ſubdivided into halves, quarters, and furlongs, ſerves to regiſter the revolutions of the other hand, and to keep account of the half miles and miles paſſed over as far as twelve miles.

The uſe of this inſtrument is obvious from its conſtruction. Its proper office is in the ſurveying of roads and large diſtances, where a great deal of expedition, and not much accuracy, is required. It is evident, that driving it along, and obſerving the hands, has the ſame effect as dragging the chain, and taking account of the chains and links. Its advantages are its handineſs and expedition; its contrivance is ſuch, that it may be fitted to the wheel of a coach, in which ſtate it performs its office, and meaſures the road without any trouble at all.

PER Arsin et Thesin, in muſic. Per arſin, in a ſong, counterpoint, figure, &c. is when the notes aſcend from grave to acute; and per theſin, when they deſcend from acute to grave.

PERCA, the pearch, in ichthyology, a genus of the acanthopterygious order of fiſhes, the characters of which are, that the branchioſtege membrane on each ſide contains ſeven bones, and the back has one or two fins.

Beſides the common pearch, this genus comprehends the lucius and lucioperca. See the articles Lucius and Lucioperca.

The pearch is diſtinguiſhed by ſeveral tranverſe ſtreaks, and by having the belly-fins red: it grows in ſome places to a foot and a half in length, and is conſiderably thick in proportion; but its more uſual ſize is eight or nine inches in length: its noſtrils are large and patulous, and nearer the eyes than the extremity of the ſnout.

PERCEPTION, in logic, the firſt and moſt ſimple act of the mind, whereby it perceives or is conſcious of its ideas. See the article Idea.

In bare perception, the mind is for the moſt part only paſſive; yet impreſſions made on the ſenſes cauſe no perception, unleſs they are taken notice of by the mind, as we ſee in thoſe who are intently buſied in the contemplation of certain objects. It ought alſo to be obſerved, that the ideas we receive by perception are often altered by the judgment, without our taking notice of it; ſo that we take that for the perception of our ſenſes, which is but an idea formed by the judgment: thus, a man who reads, or hears, without attention, takes little notice of the characters or ſounds, but of the ideas excited in him by them. See the article Judgment.

The faculty of perception ſeems to be that which conſtitutes the diſtinction between the animal kingdom and the inferior parts of nature. Perception is alſo the firſt ſtep towards knowledge, and the inlet of all the materials of it; ſo that the fewer ſenſes a man has, and the duller the impreſſions that are made by them are, the more remote he is from that knowledge which is to be found in other men. See Knowledge.

PERCH, or Pearch, *Perca*. See the article Perca.

Perch, a meaſure of length. See the article Measure.

PERCUSSION, in mechanics, the impreſſion a body makes in falling or ſtriking upon another, or the ſhock of two bodies in motion. See the article Motion.

Percuſſion is either direct or oblique; direct, when the impulſe is given in a line perpendicular to the line of contact; and oblique, when it is given in a line oblique to the point of contact. See the article Center.

PERENNIAL, in botany, is applied to thoſe plants whoſe roots will abide many years, whether they retain their leaves in winter or not: thoſe which retain their leaves are called ever-greens; but ſuch as caſt their leaves, are called deciduous, or perdifols. Some of theſe have annual ſtalks, which die to the root every autumn, and ſhoot up again in the ſpring; to which Jungius gives the title of radix reſtibilis.

PERESKIA, in botany, a trailing plant, with many ſlender branches beſet with long white ſpines, produced in tufts; the leaves are roundiſh, very thick, and ſucculent; the flower is roſaceous, conſiſting of ſeveral petals, which are placed orbicularly: the fruit is ſoft, fleſhy, and globular, about the ſize of a walnut, having tufts of ſmall leaves on it, and contains many flat roundiſh ſeeds, included in a whitiſh mucilaginous pulp. This plant grows naturally in ſome parts of the Spaniſh Weſt-Indies, and is included by Linnæus among the cactus, which ſee.

PERFECTION, the ſtate or quality of a thing perfect.

PERFUME, *Suffitus*, an agreeable artificial odour, affecting the organ of ſmelling. The generality of perfumes are made up of muſk, ambergriſe, civet, roſe and cedar-woods, orange-flowers, jaſmin, jonquils, tuberoſes, and other odoriferous flowers: thoſe drugs commonly called aromatics, ſuch as ſtorax, frankincenſe, benzoin, cloves, mace, &c. enter the compoſition of a perfume: ſome are alſo compoſed of aromatic herbs or leaves, as lavender, marjoram, ſage, thyme, hyſſop, &c.

Perfumes were antiently very much in uſe: but ſince people are become ſenſible of the harm they do the head, they are generally diſuſed among us; however they are ſtill common in Spain and Italy.

Perfumes, in pharmacy, are topical or external remedies, compoſed of certain powders and gums, wich being mixed together, and thrown on the coals, produce a vapour and ſmoke of great uſe in ſeveral diſeaſes. There are dry perfumes made up in troches, pills, &c. of olibanum, maſtic, olives, &c. and moiſt viſcous ones mixed with the juices of herbs.

PERIAGOGE, or Peribole, in rhetoric, is uſed where many things are accumulated into one period which might have been divided into ſeveral.

PERIANTHIUM, in botany expreſſes that ſort of cup of a flower which either conſiſts of ſeveral leaves, or elſe of one leaf divided into ſeveral ſegments, and ſurrounds the lower part of the flower.

PERICARDIUM, in anatomy, a membranaceous bag, looſely including the heart, and ſituated in the middle and lower part of the thorax, between the two lobes of the lungs. See Heart.

PERICARPIUM, among botaniſts, a caſe or covering for the ſeeds of plants, and is the germen of the piſtillum enlarged; it is defined by Linnæus as an entrail of the plant big with ſeeds, which it diſcharges when ripe; and is diſtinguiſhed according to the circumſtances that attend it by the following appellations: 1. A capſule. 2. A pod. 3. A legumen. 4. A conceptacle. 5. A drupe. 6. An apple. 7. A berry. 8. A nut. 9. A ſtrobilus. See the articles Capsule, Pod, &c.

PERICRANIUM, in anatomy, a thick ſolid coat, or membrane covering the outſide of the cranium or ſkull.

PERIDROME, *Peridromus*, in ancient architecture, the ſpace, gallery, alley, or the like, in a periptere, between the columns and the wall.

PERIGÆUM, Perigee, in aſtronomy, that point of the ſun's or moon's orbit, wherein they are at their leaſt diſtance from the earth, in which ſenſe it ſtands oppoſed to apogee. See Apogee.

In the antient aſtronomy, perigee denotes that point in a planet's orbit, wherein the centure of its epicycle is at the leaſt diſtance from the earth.

PERIHELIUM, in aſtronomy, that point of a planet's, or comet's orbit, wherein it is in its leaſt diſtance from the ſun; in which ſenſe it ſtands in oppoſition to aphelium.

The antient aſtronomers, on account of their ſuppoſing the earth in the center of the ſyſtem, inſtead of this term uſed that of perigæum.

PERIMETER, in geometry, the bounds or limits of any figure or body.

The perimeter of ſurfaces or figures are lines, thoſe of bodies are ſurfaces. In circular figures, inſtead of perimeter, we ſay circumference, or periphery.

PERINÆUM, or Perineum, in anatomy, the ſpace between the anus and the parts of generation, divided into two equal lateral diviſions, by a very diſtinct line, which is longer in males than in females.

PERIOD, in aſtronomy, the time taken up by a ſtar or planet in making a revolution round the ſun; or the duration of its courſe till it return to the ſame point of its orbit.

Periods, in chronology, denotes a revolution of a certain number of years, or a ſeries of years, whereby, in different nations, and on different occaſions, time is meaſured; ſuch are the following.

Calippic Period, a ſyſtem of ſeventy-ſix years.

The calippic period comprehends 48 common years, and 28 intercalary ones, 940 lunations, and 22759 days.

Dionyſian Period, or *Victorian* Period, a ſyſtem of 532 lunæ-ſolar and Julian years, which being elapſed, the characters of the moon fall again upon the ſame day and feria, and revolve in the ſame order, according to the opinion of the antients.

This period is otherwiſe called the great paſchal cycle, becauſe the Chriſtian church firſt uſed it, to find the true time of the paſcha, or Eaſter. The ſum of theſe years ariſe by multiplying together the cycles of the ſun and moon. See the article Easter.

Hipparchus's Period, a ſyſtem of 304 years, both lunar and ſolar, which being elapſed, Hipparchus thought that the reckoning by the lunar motion would coincide again with the ſolar meaſures. This period comprehends 3760 lunar months, or 111039 days; the ſum of which ariſes from the multiplication of the calippic period by 4, ſubtracting unity from the product.

Julian Period. See Julian.

Metonic Period, that invented by Meton, being the ſame with the cycle of the moon. See the article Cycle.

Period, in grammar, denotes a ſmall compaſs of diſcourſe, containing a perfect ſentence, and diſtinguiſhed at the end by a point, or full ſtop, thus (.); and its members or diviſions marked by commas, colons, &c. See the articles Point and Sentence.

Period is alſo uſed for the character (.) wherewith the periods of a diſcourſe are terminated, or expreſſed, being commonly called a full ſtop or point. See the article Punctuation.

Period, in numbers, a diſtinction made by a point, or comma, after every ſixth place or figure; and is uſed in numeration for the readier diſtinguiſhing and naming the ſeveral figures or places.

Period *of a Diſeaſe*, in medicine, is the time betwixt the acceſs of one fit, or paroxiſm, and that of the next, including the entire exacerbation, decline,

cline, and intermiſſion, or remiſſion. Theſe, in ſome diſorders, are very regular and conſtant, as in intermitting fevers; but in chronical diſorders, more irregular and uncertain, as in epilepſies; hence ſuch diſeaſes are called periodical.

PERIODIC, or PERIODICAL, ſomething that terminates or comprehends a period: ſuch is a periodic month, being the ſpace of time wherein the moon diſpatches her period; a periodic diſeaſe, &c. See MONTH, DISEASE, PERIOD, &c.

PERIOECI, ϖεριοικοι, in geography, ſuch inhabitants of the earth, as have the ſame latitudes, but oppoſite longitudes; or live under the ſame parallel, and the ſame meridian, but in different ſemicircles of that meridian, or in oppoſite points of the parallel. Theſe have the ſame common ſeaſons throughout the year, and the ſame phænomena of the heavenly bodies; but when it is noon day with the one, it is midnight with the other; there being twelve hours between them in an eaſt or weſt direction. Theſe are found on the globe, by the hour index, or by turning the globe half round, that is 180 degrees either way.

PERIOSTEUM, or PERIOSTIUM, in anatomy, a nervous vaſculous membrane, endued with a a very quick ſenſe, immediately ſurrounding, in every part, both the internal and external ſurfaces of all the bones in the body, excepting only ſo much of the teeth as ſtand above the gums, and the peculiar places on the bones, in which the muſcles are inſerted. It is hence divided into the external and internal perioſteum; and where it externally ſurrounds the bones of the ſkull, it is called the pericranium.

PERIPATETIC PHILOSPHY, that ſyſtem taught and eſtabliſhed by Ariſtotle, and maintained by his followers, the peripatetics, called alſo Ariſtotelians.

The greateſt and beſt part of Ariſtotle's philoſophy, he is ſaid to have borrowed from his maſter Plato. Serranus affirms confidently, and ſays that he is able to demonſtrate it, that there is nothing exquiſite in any part of Ariſtotle's philoſophy, dialectics, ethics, politics, phyſics, or metaphyſics, but is found in Plato: and of this opinion are many of the ancient authors, Clemens Alexandrinus, &c. Ariſtotle's philoſophy preſerved itſelf *in puris naturalibus*, a long time, none of his followers or commentators having dared to make any innovation therein, till the beginning of the thirteenth century, when it began to be new modelled. A reformed ſyſtem of peripateticiſm was firſt introduced into the ſchools in the univerſity of Paris, from whence it ſoon ſpread throughout Europe, and has ſubſiſted in the univerſities to this day, under the name of ſchool philoſophy; the foundation whereof is Ariſtotle's doctrine frequently miſunderſtood, and oftener miſapplied: but of theſe, at different times, have ſprung ſeveral branches, as the Thomiſts, Scotiſts, nominaliſts, &c. See the articles THOMISTS, &c.

PERIPETIA, ϖεριπετεια, in the drama, that part of a tragedy, wherein the action is turned, the plot unravelled, and the whole concludes. See the article CATASTROPHE.

The qualities of the peripetia are, that it be probable and neceſſary; in order to which it muſt be the natural reſult, at leaſt the effect of the foregoing action, or of the ſubject itſelf, and muſt not ſtart from any foreign or collateral cauſe. The peripetia is ſometimes induced by remembrance or diſcovery, and ſometimes without any diſcovery.

PERIPHERY, in geometry, the circumference of a circle, ellipſes, or any other regular curvilinear figure. See the article CIRCUMFERENCE, CIRCLE, &c.

PERIPHRASIS, in rhetoric, the ſame with circumlocution. See the article CIRCUMLOCUTION.

PERIPLOCA, climbing dog's-bane, in botany, a genus of plants, whoſe flower is plane, monopetalous, rotated, and cut into five narrow ſegments, which are emarginated; it hath a ſmall nectarium going round the center of the petal, and five incurved filaments which are ſhorter than the corolla: the ſtamina are ſhort, and topped with erect antheræ, which join in a head: the fruit conſiſts of two large, oblong, ventricoſe follicles, each formed of a ſingle valve, having one cell, which contains a number of imbricated ſeeds crowned with down: the receptacle is longitudinal and hairy.

PERIPNEUMONY, in medicine, an inflammation of the lungs, attended with a weight in the lungs, a difficulty of breathing, and an oppreſſion of the breaſt, with a purulent ſpitting, and a fever accompanied with a cough. When the inflammation affects both the lobes, and the whole body of the lungs, the caſe is deſperate.

The peripneumony is diſtinguiſhed into two kinds; one of which has its ſeat at the extremity of the pulmonary artery, and is called the true peripneumony; and the other is ſituated in the bronchial arteries, and is called the ſpurious or baſtard peripneumony.

The true peripneumony is often cured by a critical reſolution and concoction of the morbific matter, which is either attenuated, ſo as to be returned into the channels in the common courſe of circulation; or expectorated by coughing; which may be eaſily known by an abatement of the ſymptoms, and the patient's falling into gentle breathing ſweats.

Copious bleeding is the moſt effectual remedy in the beginning of this diſeaſe; but not ſo proper when expectoration goes on ſucceſsfully, becauſe it ſometimes ſuppreſſes it, and in that caſe ſudorifics thicken the matter which is expectorated. The motions of nature ought to be followed: the aliment ought to be more ſlender and thin than in any other inflammatory diſeaſe whatſoever; common whey is ſufficient to preſerve the ſtrength of the patient; relaxing aliments are proper, of which barley, and all its preparations, are the beſt. Dieuretics that have not much acrimony are uſeful; and for this intention, an infuſion of fennel-roots in warm water, with milk, is good. If nature relieves by a diarrhœa, without ſinking the ſtrength of the patient, it ought to be promoted by emollient clyſters. But if the patient is neither relieved nor dies in eight days, the inflammation will end in a ſuppuration, and an abſceſs of the lungs, and ſometimes in ſome other part of the body: in this caſe bleeding muſt be forborne; the diet muſt be mild, ſoft, incraſſating, and more plentiful; and tepid vapours ſhould be taken into the lungs, from decoctions of proper ingredients. When, by the ſymptoms and time, the impoſthume may be judged to be ripe, the vapour of vinegar, and any thing that creates a cough, are proper; for the ſooner it is broke, the leſs danger will the lungs be in. In this ſtate, which is not abſolutely deſperate, the aliment ought to be milk, and the drink milk and barley-water, with gentle anodynes, and the patient may have ſome reſt.

Spurious or *Baſtard* PERIPNEUMONY, a diſeaſe of the lungs, which generally ariſes from a heavy pituitous matter generated in the blood, and caſt upon the lungs.

In this diſorder, the patient is hot and cold by turns, is giddy upon the leaſt motion, and complains of a rending pain of the head whenever he coughs; he vomits up every thing that he drinks; the urine is turbid and red, and the whole thorax full of pain. To remedy which, he ſhould be let blood from a large orifice; and then give him the following clyſter, which muſt be repeated daily, till the ſymptoms evince that the lungs are relieved: take of honey, three ounces; of nitre, one dram; one yolk of an egg; and eight ounces of barley-ley-water; make them into a clyſter. Let the patient's diet be very ſlender, ſuch as weak broths, ſharpened a little with orange or lemon-juice; and he may drink a weak mixture of honey and water: the ſteams of warm water may be taken in at the mouth, and the following decoction may be given him: take of the roots of fennel, two ounces; of the roots of graſs, four ounces; of the leaves of pellitory, and agrimony, each a handful and a half; of the bruiſed ſeeds of white poppy, one ounce; and of liquorice, one ounce and a half; boil them, for a quarter of an hour, in two pints and a half of water: of which, let the patient drink two ounces every two hours. Likewiſe, let his legs and feet be bathed, and large bliſters applied.

PERIPTERE, in the ancient architecture, a building encompaſſed on the outſide with a ſeries of inſulated columns, forming a kind of portico all around; ſuch were the portico of Pompey, the ſeptizon of Severus, and the baſilica of Antoninus.

The peripteres were properly temples, which had columns on all the four ſides, by which they were diſtinguiſhed from the proſtyle and amphiproſtyle, the laſt of which had no columns before, and the firſt none on the ſides.

M. Perault obſerves, that periptere, in the general ſenſe of the word, is the name of a genus, including all the ſpecies of temples, which have porticos of columns all around, whether the columns be diptere, or pſeudo-diptere, or ſimply periptere, which is a ſpecies that bears the name of a genus, and which has its columns diſtant from the wall, the breadth of an intercolumnation.

PERISCII, in geography, the inhabitants of either frigid zone, between the polar circles and the poles; where the ſun, when in the ſummer ſigns, moves only round about them, without ſetting, and conſequently their ſhadows, in the ſame day, turn to all the points of the horizon.

PERISKYTISM, in ancient ſurgery, an inciſion made under the coronal ſuture, reaching from one temple acroſs to the other, penetrating to the bone of the cranium.

PERISTALTIC, in medicine, a vermicular ſpontaneous motion of the inteſtines, performed by the contraction of the circular and longitudinal fibres, of which the fleſhy coats of the inteſtines are compoſed; by means whereof the chyle is driven into the orifices of the lacteal veins, and the fæces are protruded towards the anus. See CHYLIFICATION.

When this motion comes to be depraved, and its direction changed, ſo as to proceed from below upwards, it produces what is called the illiac paſſion. See the article ILLIAC PASSION.

PERISTAPHYLINUS, in anatomy, a name which ſome give to a muſcle of the uvula, more properly denominated pterygoſtaphylinus. See the article UVULA and PTERYGOSTAPHYLINUS.

PERISTYLE, in ancient architecture, a building encompaſſed with a row of columns on the inſide: ſuch was the hypæthre temple of Vitruvius, and ſuch are now ſome baſilicas in Rome, ſeveral palaces in Italy, and moſt cloiſters of religious.

Periſtyle is alſo uſed, by modern writers, for a range of columns, either within or without a building: thus we ſay, the Corinthian periſtyle of the portal of the Louvre, &c.

PERISYSTOLE, in medicine, the interval of reſt between the two motions of the heart, viz. that of the ſyſtole, or contraction, and that of the diaſtole, or dilatation.

PERITONÆUM, in anatomy, is a thin, ſmooth, and lubricous membrane, inveſting the whole internal ſurface of the abdomen, and containing moſt of the viſcera of that part, as it were in a bag.

PERITROCHIUM, in mechanics, denotes a wheel, or circle, concentric with the baſe of a cylinder,

linder, and moveable together with it, about an axis. See Axis *in Peritrochio*.

PERJURY, in law, the crime of ſwearing falſely, where a lawful oath is adminiſtered by one in authority, in a matter relating to the iſſue or cauſe in queſtion, whether it be a perſon's own wilful act, or done by the ſubordination of others.

PERIWINKLE, in the hiſtory of ſhell-fiſh, a ſpecies of buccinum. See Buccinum.

Periwinkle, *Vinca*, in botany. See the article Vinca.

PERMANENT, in general, ſomething that continues the ſame, whether in nature or ſituation, and other circumſtances: thus, air generated by fermentation, is ſaid to be permanent, becauſe it continues to ſhew all the natural properties of the common air.

Thus, alſo, thoſe cups of flowers are called permanent, which remain after the flower-leaves are fallen.

PERMEABLE, a term applied to bodies of ſo looſe and porous a ſtructure, as to let ſomething paſs through them.

PERMUTATION, in commerce, the ſame with bartering. See Bartering.

In the canon-law, permutation denotes the actual exchange of one benefice for another.

Permutation *of Quantities*, in algebra, the ſame with combination.

PERNIONES, Chilblains, or Kibes, in ſurgery, a name given to thoſe tumours which happen in the hands and feet, from violent cold. See the article Cold.

Chilblains are accompanied with inflammation, heat, redneſs, pricking pain, and immobility of that limb: ſometimes they are of a livid or leaden colour, and ſometimes they break out with ſcabs, or elſe with chops or ſlits, which afterwards penetrate deeper, and become ulcerous. The humour which they diſcharge is a little fœtid, and pretty much reſembles pus or ſanies; and they terminate in either diſperſion, ſuppuration, or gangrene, and ſphacelus.

While the chilblains are yet tumified and red, and the part retains its ſenſe and motion, without any great heat and pain, the diſorder is then of the mildeſt kind; on the contrary, when they are livid, occaſion the ſkin to become ſtiff and inſenſible, or excite pricking pains therein, there is then danger of a worſe conſequence, leſt it ſhould degenerate into a gangrene, or at leaſt a deep exulceration.

There being no room to doubt but that cold is the cauſe of chilblains, it readily follows, that the cure muſt conſiſt chiefly in reſtoring the blood to its former fluidity, and free circulation, as ſoon as poſſible; for which purpoſe, an external as well as internal treatment is neceſſary.

In the external treatment, the patient being expoſed in a temperate air, ſhould, according to Heiſter, exerciſe his limbs as much as poſſible, in order to advance him ſtill to a greater warmth or heat; but when he is too weak to exerciſe himſelf, it will be proper to bathe the parts affected with ſnow, or cold water; after which, when the limb becomes ſenſible, comfortable medicines may be applied, ſuch as ſpirit of wine, either pure or with theriaca, rock-oil, balſam of ſulphur, &c. When the parts affected have been well rubbed or bathed with theſe, the patient may then be advanced towards the fire, or be put to bed, endeavouring afterwards to excite a gentle ſweat.

In the internal treatment, great ſervice will be had from a few glaſſes of hot wine, wherein has been boiled ſome cinnamon and ſugar; though it may not be improper to give with this, alternately, a ſmall quantity of ſome ſudorific mixture.

If the wine be not at hand, good ale, boiled with cinnamon, cloves, and ſugar, may well enough ſupply its place. It ſhould be continued ſo as to keep up a ſweat for a whole hour, for half an hour, or according to the ſeveral circumſtances: but if the diſorder is much ſlighter, this method is then not ſo directly neceſſary; it may then be laid aſide: though, in the opinion of Heiſter, it is much preferable to any other method. When chilblains tend to a ſuppuration, then it is proper to treat them like other abſceſſes. See the article Abscess.

If a patient has before been troubled with chilblains, which are uſed to return every year in the winter, the preſervative againſt the diſorder is to anoint the parts affected with petroleum, or oil of turpentine, before and after the ſeverity of the winter comes on; but when the diſorder has begun to ſhew itſelf again by tumour, inflammation, and pain, the heel or finger may be wrapped up in a ſwine's bladder, dipped in the 'fore-mentioned oil, and the cold itſelf ſhould always be carefully avoided by proper cloths, or coverings.

PERORATION, *Peroratio*, in rhetoric, the epilogue, or laſt part of an oration, wherein what the orator had inſiſted on through his whole diſcourſe, is urged afreſh with greater vehemence and paſſion.

The peroration conſiſts of two parts. 1. Recapitulation, wherein the ſubſtance of what was diffuſed throughout the whole ſpeech, is collected briefly, and curſorily, and ſummed up with new force and weight. 2. The moving the paſſions, which is ſo peculiar to the peroration, that the maſters of the art call this part ſedes affectuum. The paſſions to be raiſed are various, according to the various kinds of oration. In a panegyric, love, admiration, emulation, joy, &c. In an invective, hatred, contempt, &c. In a deliberation, hope, confidence, or fear. The qualities required in the peroration are, that it be very vehement and paſſionate, and that it be ſhort; becauſe, as Cicero obſerves, tears ſoon dry up.

PERPENDICULAR, in geometry, a line falling directly on another line, ſo as to make equal angles on each ſide; called alſo a normal line. See ANGLE.

PERPENDICULAR *to a Parabola*, is a right-line cutting the parabola in the point in which any other right-line touches it, and is alſo itſelf perpendicular to that tangent.

PERPENDICULARITY OF PLANTS, in natural hiſtory, a quality obſerved in all plants, which, though they riſe a little crooked, yet the ſtems ſhoot up, and the roots ſink down, as much as poſſible in a perpendicular direction.

This curious phænomenon was firſt obſerved by M. Dodart, who publiſhed an expreſs eſſay on the affectation of perpendicularity obſerved in the ſtems or ſtalks of all plants, in the roots of many, and even in their branches. He obſerves, that ſuch plants, or parts of plants, as by the declivity of the ſoil come out inclined, or ſuch as are diverted out of the perpendicular by any violent means, again redreſs and ſtraighten themſelves, and recover their perpendicularity by making a ſecond or contrary bend, or elbow, without rectifying the firſt.

PERPETUITY, in law, is when an eſtate is intended to be ſo ſettled in tail, &c. that it may not poſſibly be undone, or made void.

PERQUISITE, in law, is any thing gotten by a man's own induſtry, or purchaſed with his money; in contradiſtinction to what deſcends to him, from his father or other anceſtors.

PERQUISITES *of Courts*, are the profits which caſually accrue to a lord of the manor from his courts-baron, by fines for copyholds, eſcheats, heriots, amercements, &c.

PERRON, in architecture, the ſteps in the front of a building, raiſed before the doors of great houſes, and leading to the firſt ſtory, when raiſed above the level of the ground.

PERRY, a drink made of pears, in the ſame manner as cyder is made from apples. See the article CYDER.

PERSEA, Avocado-pear, in botany, an ever-green-tree, which grows to the height of thirty feet, and upwards; the trunk is large, ſmooth, and of an aſh-colour; the branches are furniſhed with large, oblong, ſmooth leaves, like thoſe of laurel, and of a deep green-colour; the flowers are produced towards the extremities of the branches, and are hexapetalous, acuminated, and ſpread open: the fruit is fleſhy and pyramidical (about the ſize of one of our largeſt pears) incloſing a large oval ſeed, with two lobes, included in a thin ſhell.

This tree grows in great plenty in the Weſt-Indies, and is eſteemed by its inhabitants not only as a deſert, but as very neceſſary for the ſupport of life: the fruit alone is very inſipid, for which reaſon they generally eat it with the juice of lemons and ſugar, to give it a pungency; it is very nouriſhing and is reckoned a great incentive to venery: it is eaten by ſome people with vinegar and pepper.

This plant is comprehended by Linnæus among the laurus; it is raiſed from ſeed, and requires a hot-houſe in this climate to preſerve it.

PERSECUTION, is any pain or affliction which a perſon deſignedly inflicts upon another; and, in a more reſtrained ſenſe, the ſufferings of chriſtians on account of their religion.

PERSEVERANCE, in theology, a chriſtian virtue, by which we are enabled to perſiſt in the way of ſalvation to the end.

PERSEUS, in aſtronomy, a conſtellation of the northern hemiſphere, which, according to the catalogues of Ptolemy and Tycho, contains twenty-nine ſtars; but in the Britannic catalogue, ſixty-ſeven.

PERSIAN-WHEEL, an engine, or wheel, turned by a rivulet, or other ſtream of water, and fitted with open boxes at its cogs, to raiſe water for the overflowing of lands, or other purpoſes.

It may be made of any ſize, according to the height the water is to be raiſed to, and the ſtrength of the ſtream by which it is turned. This wheel is placed ſo, that its bottom only is immerſed in the water, wherein the open boxes at its cogs are all filled, one after another, with water, which is raiſed with them to the upper part of the wheel's circuit, and then naturally empties itſelf into a trough which carries it to the land.

PERSICA, the peach, in botany. See the article PEACH.

PERSICARIA, arſmart, in botany, a genus of plants, whoſe flower is monopetalous, and cut into five ſpreading ſegments; there is no pericarpium, but the ſeed, which is ſingle, roundiſh, and acute-pointed, is contained in the corolla, which is permanent.

There is great irregularity in this genus, ſome ſpecies having only five ſtamina, and others ſix or eight, and one, two, or three ſtyles.

The perſicaria orientalis is a large plant, and cultivated in our gardens; it riſes to the height of eight or ten feet, where the ſoil is moiſt, and is furniſhed with large leaves, like thoſe of tobacco, of a bright green, and a little hairy; the branches are terminated with ſpikes of flowers of pink-colour, ſeven or eight inches long, hanging downwards. This plant is annual, and begins to ſhew its flowers about the beginning of Auguſt, and makes a beautiful appearance, until the froſts in Autumn put a ſtop thereto. The propagation of this plant is eaſy, for if the ſeeds are ſuffered to ſhed where the plants grow, they will come up in plenty in the ſpring, at which time they may be tranſplanted where they are to remain.

The ſpotted arſmart ſends forth ſtalks to the height of a foot; they are hollow, reddiſh, branched and jointed; the leaves are ſhaped like thoſe of the peach-tree, and marked with black ſpots; the flowers grow in ſpikes, and come out in July and Auguſt. It grows wild in watery, marſhy, and moiſt ditches, almoſt every where.

Another ſpecies, called by ſome water-pepper, and biting arſmart, grows in moiſt places; it is extremely hot and penerating, inſomuch that the taſte is hardly tolerable; this has made it obtain in ſcorbutic caſes, hypochondriac affections, and all diſorders ariſing from a ſluggiſh circulation of the fluids; and its diſtilled water, given in two or three ounces, is accounted a ſpecific againſt the gravel and ſtone: all authors agree, that the herb applied to old ulcers eats away proud fleſh, cleanſes, and dries them; applied as a cataplaſm to the bruiſes of horſes, it reſolves the coagulated blood; and if wounds or ulcers are waſhed with the juice, the flies will never come near them.

PERSON, an individual ſubſtance of a rational or intelligent nature. Thus we ſay, an embaſſador repreſents the perſon of his prince; and that in law, the father and ſon are reputed the ſame perſon.

PERSON, in dramatic poetry, the character aſſumed by an actor, or he who is repreſented by the player. Thus, at the head of dramatic pieces, is placed the dramatis perſonæ, or liſt of the perſons that are to appear on the ſtage.

Father Boſſu obſerves, that in the epic and dramatic poem the ſame perſon muſt reign throughout; that is, muſt ſuſtain the chief part through the whole piece, and the characters of all the other perſons muſt be ſubordinate to him.

PERSON, in grammar, a term applied to ſuch nouns or pronouns, as being either prefixed or underſtood, are the nominatives in all inflections of a verb; or it is the agent or patient in all finite and perſonal verbs.

PERSONABLE, in law, ſignifies the being able to maintain a plea in court; eſpecially in the caſe of an alien, who may be made perſonable by act of parliament.

It is alſo uſed to ſignify a capacity to receive any thing granted or given.

PERSONAL, any thing that concerns, or is reſtrained to, the perſon: thus it is a maxim in ethics, that all faults are perſonal.

PERSONAL ACTION, in law, is an action levied directly and ſolely againſt the perſon, in oppoſition to a real or mixed action.

PERSONAL GOODS, or CHATTELS, in law, ſignifies any moveable thing belonging to a perſon, whether alive or dead.

PERSONAL TYTHES, are tythes payable out of the profits obtained by a man's perſonal labour and induſtry, as in buying, ſelling, handicraft, &c.

PERSONAL VERB, in grammar, a verb conjugated in all the three perſons; thus called, in oppoſition to an imperſonal verb, or that which has the third perſon only. See IMPERSONAL VERB.

PERSONALITY, in the ſchools, that which conſtitutes an individual a diſtinct perſon.

PERSONATED-FLOWERS, among botaniſts, are thoſe which reſemble the gaping mouths of certain living animals: they belong to the angioſperma order of the didynamia claſs, in botany: ſuch are the ſnap-dragon, eye-bright, cow-wheat, rhinanthus, &c.

PERSPECTIVE, that branch of optics, which teaches how to repreſent objects on a plane ſuperficies, ſuch as they would appear at a certain diſtance and height, upon a tranſparent plane perpendicular to the horizon, placed between the objects and the eye.

The foundation of perſpective may be thus conceived: ſuppoſe the pentagon A B D E F (plate LXXIII. *fig.* 7.) were to be repreſented by the rules of perſpective on the tranſparent plane V P, placed perpendicularly on the horizontal plane H R; dotted lines are imagined to paſs from the eye C to each point of the pentagon, as C A, C B, C D, &c. which are ſuppoſed in their paſſage through the plane P V, to leave their traces or veſtigia in the points *a*, *b*, *d*, &c. on the plane, and thereby to delineate the pentagon *a b d e f*; which, as it ſtrikes the eye by the ſame rays that the original pentagon A B D E F does, will be a true perſpective repreſentation of it.

The buſineſs of perſpective, therefore, is to lay down geometrical rules for finding the points *a b d e f* upon the plane; and hence, alſo, we have a mechanical method of delineating any object very accurately.

Perſpective is either employed in repreſenting the ichnographies, or ground-plots of objects; or the ſcenographies, or repreſentations of the objects themſelves. See the articles ICHNOGRAPHY and SCENOGRAPHY.

The horizontal line is that ſuppoſed to be drawn parallel to the horizon through the eye of the ſpectator; or rather, it is a line which ſeparates the heaven from the earth, and which limits the ſight. Thus A, B, (*fig.* 8.) are two pillars below the horizontal line, C D, by reaſon the eye is elevated above them; in *fig.* 3. they are ſaid to be equal with it; and in *fig.* 4. raiſed above it. Thus, according to the different points in view, the objects will be either higher or lower than the horizontal line. The point of ſight, A (*fig.* 9.) is that which makes the centrical ray on the horizontal line, *a b*; or it is the point where all the other viſual rays, D, D, unite. The points of diſtance, C, C, are points ſet off in the horizontal line, at equal diſtances, on each ſide of the point of ſight, A; and, in the ſame figure, B B repreſents the baſe line, or fundamental line; E E is the abridgment of the ſquare, of which D, D, are the ſides; F, F, the diagonal lines, which go to the points of diſtance, C, C. Accidental points, are thoſe where the objects end: theſe may be caſt negligently, becauſe neither drawn to the point of ſight, nor to thoſe of diſtance, but meeting each other in the horizontal line; for example, two pieces of ſquare timber, G and H (*fig.* 10.) make the points I, I, I, I, on the horizontal line; but go not to the point of ſight K, nor to the point of diſtance C, C: theſe accidental points ſerve likewiſe for caſements, doors, windows, tables, chairs, &c.

The point of direct view, or of the front, is when we have the object directly before us; in which caſe it ſhews us only the foreſide; and, if below the horizon, a little of the top; but nothing of the ſides, unleſs the object be polygonous. The point of oblique view, is when we ſee an object aſide of us, and, as it were, aſlant, or with the corner of the eye; the eye, however, being all the while oppoſite to the point of ſight; in which caſe, we ſee the object laterally, and it preſents to us two ſides or faces. The practice is the ſame in the ſide points as in the front points; a point of ſight, point of diſtance, &c. being laid down in the one as well as in the other.

We ſhall now give ſuch rules as are of more general uſe in the practice of perſpective. 1. Let every line, which in the object, or geometrical figure, is ſtraight, perpendicular, or parallel to its baſe, be ſo alſo in its ſcenographic delineation. 2. Let the lines, which in the object return at right angles from the fore-right ſide, be drawn ſcenographically from the viſual point. 3. Let all ſtraight lines, which in the object return from the fore-right ſide, run in a ſcenographic figure into the horizontal line. 4. Let the object you intend to delineate, ſtanding on your right-hand, be placed alſo on the right-hand of the viſual point; and that on the left-hand, on the left-hand of the ſame point; and that which is juſt before, in the middle of it. 5. Let theſe lines which are (in the object) equidiſtant to the returning line, be drawn in the ſcenographic figure, from that point found in the horizon. 6. In ſetting off the altitude of columns, pedeſtals, and the like, meaſure the height from the baſe line upward, in the front, or fore-right ſide; and a viſual ray down that point in the front ſhall limit the altitude of the column or pillar, all the way behind the fore-right ſide, or orthographic appearance, even to the viſual point. This rule you muſt obſerve in all figures, as well where there is a front or fore-right ſide, as where there is none. 7. In delineating ovals, circles, arches, croſſes, ſpirals, and croſs-arches, or any other figure in the roof of any room, firſt draw ichnographically, and ſo with perpendiculars from the moſt eminent points thereof, carry it up unto the ceiling; from which ſeveral points, carry on the figure. 8. The center in any ſcenographic regular figure is found by drawing croſs lines from oppoſite angles: for the point where the diagonals croſs, is the center. 9. A ground-plane of ſquares is alike, both above and below the horizontal line; only the more it is diſtant above or below the horizon, the ſquares will be ſo much the larger or wider. 10. In drawing a perſpective figure, where many lines come together, you may, for the directing of your eye, draw the diagonals in red; the viſual lines in black; the perpendiculars in green, or other different colour, from that which you intend the figure ſhall be of. 11. Having conſidered the height, diſtance, and poſition of the figure, and drawn it accordingly, with ſide or angle againſt the baſe; raiſe perpendiculars from the ſeveral angles, or deſigned points, from the figure to the baſe, and tranſfer the length of each perpendicular, from the place where it touches the baſe, to the baſe on the ſide oppoſite to the point of diſtance; ſo will the diametrals drawn to the perpendiculars in the baſe, by interſection with the diagonals, drawn to the ſeveral tranſferred diſtances, give the angles of the figures, and ſo lines drawn from point to point will circumſcribe the ſcenographic figure. 12. If in a landſkip there be any ſtanding-waters, as rivers, ponds, and the like, place the horizontal line level with the fartheſt ſight or appearance of it. 13. If there be any houſe, or the like, in the picture, conſider their poſition; that you may find from what point in the horizontal lines to draw the front and ſides thereof. 14. In deſcribing things at great diſtance, obſerve the proportion, both in magnitude and diſtance, in draught, which appears from the object to the eye. 15. In colouring and ſhadowing of every-thing, you muſt do the ſame in your picture, which you obſerve with your eye, eſpecially in objects lying near; but, according as the diſtance grows greater and greater, ſo the colours muſt be fainter and fainter, till at laſt they loſe themſelves in a darkiſh ſky-colour. 16. The catoptrics are beſt ſeen in a common looking-glaſs, or other poliſhed matter; where, if the glaſs be exactly flat, the object is exactly like its original; but, if the glaſs be not flat, the reſemblance alters from the original; and that more or leſs, according as the glaſs differs from an exact plane. 17. In drawing catoptric figures, the ſurface of the glaſs is to be conſidered, upon which you mean to have the reflection: for which you muſt make a particular ichnographical draught, or projection; which on the glaſs muſt appear to be a plane full of ſquares, on which projection tranſfer what ſhall be drawn on a plane, divided into the ſame number of like ſquares; which though the draught may appear very confuſed, yet the reflection of it on the glaſs will be regular, proportional, and regularly compoſed. 18. The dioptric, or broken beam, may be ſeen in a tube through a cryſtal or glaſs, which hath its ſurface cut into many others, whereby the rays of the object are broken. For to the flat of the cryſtal, or water, the rays run ſtraight; but then they break and make an angle, which alſo by the refracted beams is made and continued on the other ſide of the ſame flat. 19. When theſe faces on a cryſtal are returned towards a plane placed directly before it, they ſeparate themſelves at a good diſtance on the plane, becauſe they are all directed to various far diſtant places of the ſame. See REFLECTION and REFRACTION.

PERSPECTIVE alſo denotes a kind of painting frequently ſeen in gardens, at the ends of galleries, &c. expreſly deſigned to deceive the ſight.

PERSPECTIVE-GLASS, in optics, differs from a teleſcope in this: inſtead of the convex eye-glaſs placed behind the image, to make the rays of each pencil go parallel to the eye, there is placed a concave eye-glaſs as much before it; which opens the converging rays, and makes them emerge parallel to the eye.

The quantity of objects taken in at one view with this inſtrument, does not depend upon the breadth of the eye-glaſs, as in the aſtronomical teleſcope, but upon the breadth of the pupil of the eye.

PERSPECTIVE PLANE, is the glaſs, or other tranſparent ſurface ſuppoſed to be placed between the eye and the object, perpendicularly to the horizon. It is ſometimes called the ſection, table, or glaſs.

PERSPIRATION, in medicine, the evacuation of the juices of the body through the pores of the ſkin. Perſpiration is diſtinguiſhed into ſenſible and inſenſible: and here ſenſible perſpiration is the ſame with ſweating; and inſenſible perſpiration, that which eſcapes the notice of the ſenſes; and this laſt is the idea affixed to the word perſpiration when uſed alone.

PESADE, or PESATE, in the manege, is a horſe's raiſing his fore-quarters, and bending his feet up to his body without ſtirring his hind-feet.

PESSARY, in medicine, a ſolid ſubſtance compoſed of wool, lint, or linen, mixed with powders, oils, wax, &c. made round and long like a finger, in order to be introduced into the exterior neck of the matrix, for the cure of ſeveral diſorders incident to the uterus.

This name is alſo ſometimes given to pieces of cork, or other matters thruſt up the noſtrils, &c. to prevent the entrance of ſtrong infectious ſteams.

PESTILENCE, in medicine, an epidemical, contagious, and malignant diſeaſe, popularly known by the name of plague. See the article PLAGUE.

PESTILENTIAL FEVERS, ſuch as are attended with ſome malignant quality, and approach to the nature of a plague.

PETAL, *Petala*, among botaniſts, an appellation given to the fine coloured leaves which in common compoſe the moſt conſpicuous part of the flower, by which name they are conveniently diſtinguiſhed from the common leaves of the plant, which are called folia.

According to the number of petals the corolla is compoſed of, the flower is ſaid to be monopetalous, or containing one petal; dipetalous, when it has two; tripetalous, when three, &c. See the article FLOWER.

PETARD, in the art of war, a metalline engine, ſomewhat reſembling a high-crowned hat.

The petard may be conſidered as a piece of ordnance; it is made of copper mixed with braſs, or of lead with tin; its charge is from five to ſix pounds of powder, which reaches to within three fingers-breadth of the mouth; the vacancy is filled with tow, and ſtopped with a wooden tampion, the mouth being ſtrongly bound up with cloth tied very tight with ropes. It is covered up with a madrier, or wooden plank, that has a cavity to receive the mouth of the petard, and faſtened down with ropes.

Its uſe is in a clandeſtine attack to break down gates, bridges, barriers, &c. to which it is hung; and this it does by means of the wooden plank. It is alſo uſed in countermines to break through the enemy's galleries, and give their mines vent.

The invention of petards is aſcribed to the French Huguenots, in 1579, who with them took Cahors, as D'Aubigné tells us.

PETASITES, butterbur, in botany, is comprehended by Linnæus among the tuſſilagos, or colts-feet. See the article TUSSILAGO.

The root of the common butterbur is celebrated for its cordial and alexipharmic virtues; and beſides being aperient and detergent, is preſcribed in ſuppreſſions of urine and the menſes: as alſo in the cough, aſthma, and other diſorders of the breaſt.

PETECHIÆ, in medicine, denote ſpots in the ſkin like flea-bites, which come out in malignant fevers, hence called petechial, or ſpotted fevers.

PETER, or *Epiſtle of St.* PETER, two canonical books of the New Teſtament, written by the apoſtle St. Peter, and addreſſed to thoſe Jewiſh converts who were ſcattered throughout Pontus, Galatia, &c. not only upon the perſecution raiſed at Jeruſalem, but upon former diſperſions of the Jews into thoſe places. The firſt of theſe epiſtles is principally deſigned to comfort and confirm them, under thoſe fiery trials they were then ſubject to; and to direct them how to behave in the ſeveral ſtates and relations, both of the civil and the Chriſtian life. In the ſecond epiſtle, the apoſtle proſecutes the ſame ſubject, to prevent their apoſtacy from the faith, and guard them againſt the corrupt principles of the gnoſtics, and thoſe who ſcoffed at the promiſe of Chriſt's coming.

St. PETER'S DAY, a feſtival of the Chriſtian church, obſerved on the 29th of June.

PETER PENCE, an ancient tax of a penny on each houſe, paid to the pope.

It was called Peter-pence, becauſe collected on the day of St. Peter *ad vincula*, and ſent to Rome; whence it was alſo called Rome-ſcot, and Rome-penny.

PETESIA, in botany, a genus of plants, whoſe flower is monopetalous and funnel ſhaped; the tube is cylindric and longer than the cup, and the limb is cut into four roundiſh obtuſe ſegments: the ſtamina are four ſubulated filaments, the length of the tube, and topped with oblong antheræ. The fruit is a globoſe, coronated, bilocular berry, containing a few roundiſh ſeeds.

PETIOLE, *Petiolum*, in botany, the ſlender foot-ſtalk which connects the leaf to the branch of a plant, whereby it is diſtinguiſhed from a peduncle, which is the footſtalk of a flower. Some alſo uſe the the word petiole for the middle rib of a leaf; the branches thereof being called rami, and the ſubdiviſions of theſe, ſurculi.

PETITIO PRINCIPII, in logic, the taking a thing for true, and drawing concluſions from it as ſuch; when it is really falſe, or at leaſt wants to be proved, before any inferences can be deduced from it.

PETITION, a formal ſupplication or requeſt made by an inferior to a ſuperior, eſpecially to one having juriſdiction.

PETIVERIA, in botany, a genus of plants, whoſe flower is apetalous, only the cup being coloured red has much the appearance of ſuch; it is cut into four linear, erect, obtuſe ſegments, and contains ſix ſubulated ſtamina: the ſeed is ſingle, flatted, and emarginated, and armed with a ſtyle outwardly reflexed.

PETREA, in botany, a plant which ariſes with a woody ſtalk to the height of fifteen or ſixteen feet, which is covered with a light grey bark, ſending out ſeveral long branches; theſe have a lighter bark than the ſtem, and are furniſhed with leaves at each joint, which on the lower part are placed by threes, but on the upper part they ſtand by pairs on the branches; they are about five inches long and two and a half broad in the middle, drawing to a point at each end; they are ſtiff, the ſurface rough, of a light green, having a ſtrong midrib with ſeveral tranſverſe veins. The flowers are produced at the ends of the branches, growing in looſe bunches which are nine or ten inches long, each flower ſtanding upon a ſlender peduncle about an inch long; the cup of the flower is of one leaf, deeply cut into five obtuſe ſegments about an inch long, and are of a fine blue colour, which make them more conſpicuous than the corolla, which is monopetalous and leſs than the cup, and of a whiter colour; when the flower is decayed, the germina becomes four oblong ſeeds, wrapped up in a fringed cover. This plant may be reckoned among the firſt claſs of beautiful American trees; it grows naturally in the Spaniſh Weſt-Indies, and is propagated from ſeeds which with us muſt be obtained from the places where the trees grow naturally, and ſhould be ſown on a hot bed, and when the plants are up, they ſhould be placed ſingly in ſmall pots, in good light loamy earth, and plunged into the bark bed in the hot-houſe, where they ſhould conſtantly remain.

PETRIFACTION, in phyſiology, denotes the converſion of wood, bones, and other ſubſtances into ſtone.

PETROBUSSIANS, in church-hiſtory, a religious ſect which aroſe in France and the Netherlands, about the year 1126, ſo called from their leader Peter Bruys.

They denied that children, before the uſe of reaſon, can be juſtified by baptiſm. They alſo condemned all places of public worſhip, croſſes, crucifixes; and are ſaid to have rejected the ſacrament of the euchariſt, and prayers for the dead.

PETROLEUM, alſo called rock-oil, or oil of petre, is an extremely ſubtle and penetrating fluid, and is by much the thinneſt of all the native bitumens.

Petroleum is found in rivers, in wells, and trickling down the ſides of hills along with little ſtreams of water. In ſhort, it is the moſt frequent of all liquid bitumens, and is perhaps the moſt valuable of them all in medicine. It is to be choſen the pureſt, lighteſt, and moſt pellucid that can be had, ſuch as is of the moſt penetrating ſmell and is moſt inflammable.

It is principally uſed externally, in paralytic caſes, and in pains of the limbs. The French give it internally in hyſteric complaints, and to their children againſt worms; ſome alſo give it from ten to fifteen drops in wine, for ſuppreſſion of the menſes. Theſe, however, are rather the practices of the common people than of the faculty.

PETROSA OSSA, in anatomy, a name given to the fourth and fifth bones of the cranium, called alſo oſſa temporum, and alſo oſſa ſquamoſa; the ſubſtance whereof, as their firſt and laſt names expreſs, is ſquamoſe and very hard.

PETROSOLINUM, parſley, in botany. See the article PARSLEY.

PETUNSE, in natural hiſtory, one of the two ſubſtances whereof the porcelain or china-ware is made. See PORCELAIN.

The petunſe is a coarſe kind of flint or pebble, the ſurface of which is not ſo ſmooth, when broken, as that of our common flint.

PEUCEDANUM, hog's-fennel, in botany, a genus of umbelliferous plants, the univerſal umbel is multiplex, very long and narrow, and the particular one ſpreads open; the general corolla is uniform, and each ſingle flower is compoſed of five equal, oblong, incurved petals, which are entire; there is no pericarpium, but the fruit, which is ovate and channelled on each ſide, divides into two parts, containing two ovato-oblong, compreſſed ſeeds, convex on one ſide, with three raiſed furrows,

rows, and a broad membraneous border indented at top. A ſpecies of this genus, which grows naturally in marſhy meadows in ſeveral parts of Germany, is reckoned aperient, pectoral, and uterine; the root is the only part uſed; it is accounted good to clear the lungs of tough viſcid phlegm, and thereby to help old coughs and ſhortneſs of breath; it likewiſe opens obſtructions of the liver and ſpleen, and helps the jaundice.

PEZIZA, in botany, a genus of cryptogamious plants of the fungous kind; they are of a campanulated form, with orbiculated ſeeds of a convex plane figure. This genus comprehends the cyathoides of Micheli.

PHACA, in botany, a genus of plants, whoſe flower is papilionaceous, the vexillum is ſtraight, ovate, and large; the wings are oblong, obtuſe, and ſhort; and the carina is ſhort, compreſſed and obtuſe. The fruit is an oblong inflated legumen, whoſe upper ſurture is depreſſed towards the under, and contains ſeveral kidney-ſhaped ſeeds.

PHÆNOMENON, *φαινόμενον*, in philoſophy, denotes any remarkable appearance, whether in the heavens or on earth; and whether diſcovered by obſervation or experiments.

PHALANGIUM, ſpider-wort, in botany. See the article SPIDER-WORT.

PHALANX, in Grecian antiquity, a ſquare battalion, conſiſting of eight thouſand men, with their ſhields joined, and pikes croſſing each other; ſo that it was next to impoſſible to break it.

PHALARIS, in botany, a genus of plants whoſe flower-cup conſiſts of an uniflorous, bivalvular, membranaceous glume; the corolla is alſo a bivalvular glume, ſcarce the length of the cup; the ſtamina are three capillary filaments, topped with ovate antheræ; it hath one roundiſh compreſſed ſeed, convex on one ſide, and contained in the corolla.

PHALACROIDES, in botany, the ſame with the briza. See the article BRIZA.

PHALEUCIAN VERSE, in antient poetry, a kind of verſe which conſiſts of five feet, the firſt of which is a ſpondee, the ſecond a dactyl, and the three laſt trochees.

PHALLUS, in botany, a genus of cryptogamious plants, of the fungus kind; they are ſmooth underneath, but above are reticulated and callous.

PHANTASY, FANCY, the ſame with imagination, which ſee.

PHARISEES, a famous ſect of the Jews, who diſtinguiſhed themſelves by their zeal for the traditions of the elders, which they derived from the ſame fountain with the written word itſelf; pretending that both were delivered to Moſes from Mount Sinai, and were therefore of equal authority. From their rigorous obſervance of theſe traditions, they looked upon themſelves as more holy than other men, and therefore ſeparated themſelves from thoſe whom they thought ſinners or prophane, ſo as not to eat or drink with them; and hence, from the Hebrew word *pharis*, which ſignifies to ſeparate, they had the name of phariſees, or ſeparatiſts.

PHARMACY, the art or ſcience which teaches the election, preparation, and mixture of medicines; conſtituting one part of the therapeutic branch of medicine, the objects of which are all natural bodies.

PHARNACEUM, in botany, a genus of plants, whoſe flower hath no corolla, but the cup reſembles one, being coloured on the inſide and its edges thin; it is cut into five ovate concave ſegments, which are equal and perſiſtent: the ſtamina are five ſubulated filaments, the length of the cup, and topped with antheræ, which are bifid at their baſe: the fruit is an ovate, obſcurely three-cornered, having three cells and three valves, containing a great number of depreſſed, orbicular, ſhining ſeeds, ſurrounded with a margin.

PHARYNX, in anatomy, the upper part of the œſophagus. See the article ŒSOPHAGUS.

PHASEOLUS, the kidney or French bean, in botany, a genus of plants, producing papilionaceous flowers; the vexillum is cordated, obtuſe, emarginated, and reclined, with reflexed ſides; the alæ are ovate, the ſame length as the vexillum, and ſtand upon long ungues; the carina is narrow, and revolves ſpirally, in a contrary direction to the ſun; the filaments are ten in number, nine of which are carinated and ſpiral, and topped with ſimple antheræ: the fruit is a long, ſtraight, coriaceous ligumen, ending in an obtuſe point, containing oblong, compreſſed, kidney ſhaped ſeeds.

There are ſeveral kinds of kidney-beans cultivated for culinary purpoſes; as the liver-coloured bean, the Batterſea-bean, the Canterbury dwarf-bean, the ſpeckled dwarf-bean, and thoſe which require ſupport; ſuch are the white and ſcarlet bloſſomed beans, &c.

French-beans are propagated from the ſeeds, and are generally planted in rows, at about three inches aſunder, and about an inch deep, excepting the larger ſorts, which ſhould have a greater diſtance. The firſt ſeaſon for ſowing them is about the latter end of April, and the laſt in July; but there ſhould be intermediate ſowings in May and June, to continue the ſupply of the table, as they will not laſt above three weeks in gathering, particularly in hot dry weather.

The uſe of kidney-beans (or rather the pods) as a food, is ſo well known, as to be quite unneceſſary to mention it; they are opening, emollient, reſolvent, and promote urine, and they generally agree with moſt conſtitutions; the meal of the ſeed is ſometimes mixed in emollient cataplaſms.

PHASES, *φάσεις*, in aſtronomy, the ſeveral appearances or quantities of illumination of the moon, Venus, Mercury, and the other planets; or the ſeveral manners wherein they appear illuminated by the ſun. See the articles Moon, Venus, Mercury, &c.

PHASMATA, in phyſiology, certain appearances ariſing from the various tinctures of the clouds, by the rays of the heavenly luminaries, eſpecially the ſun and moon. Theſe are infinitely diverſified by the different figures and ſituation of the clouds, and the appulſes of the rays of light.

PHEASANT, *Phaſianus*, in ornithology, a genus of birds of the order of the gallinæ, with the ſpace about the eyes naked.

Pheasant's-Eye, *Adonis*, in botany. See the article Adonis.

PHELLANDRIUM, in botany, a genus of umbelliferous plants, the general corolla of which is almoſt uniform, and the proper flowers are unequal, and compoſed each of five acuminated, heart-ſhaped, inflexed petals, with five capillary filaments, topped with roundiſh antheræ: the fruit is naked, ſmooth, and crowned with the perianthium and two piſtils, diviſible into two parts, which form two ovate ſmooth ſeeds.

PHEONS, in heraldry, the barbed heads of darts, arrows, or other weapons.

PHILADELPHUS, *Syringa*, or mock-orange, in botany, a ſhrub, having a flexible creeping root, from which ariſe ſeveral upright ſtems and branches, covered with an aſh-coloured bark, with a white ſpongy pith; the leaves are oblong, large, pointed, veiny, a little wrinkled, crenated on their edges, with their ſurface rough, and having the taſte of a freſh cucumber: the flowers grow in looſe bunches at the tops of the branches, each ſtanding on a ſhort peduncle; they are each compoſed of four white petals, which ſpread open, with a great number of ſtamina ſurrounding the ſtyle: the flowers have a ſtrong ſcent, which, at ſome diſtance, reſembles the perfume of orange-flowers, but when near, the ſmell is too powerful for many perſons. It blows in May and June, but is ſeldom ſucceeded by ſeeds in this country.

This ſhrub riſes to the height of ſeven or eight feet, and is eaſily propagated by taking off the ſuckers in autumn, which may be planted in a nurſery for two or three years, after which they may be tranſplanted where it is intended they ſhould remain, which is commonly in wilderneſſes, among other ſhrubs of the ſame growth.

PHILIPPICS, φιλιππικοι λογοι, in literature, a name given to the orations of Demoſthenes againſt Philip king of Macedon; being eſteemed the maſter-pieces of that great orator.

Philippic is alſo a term applied to the fourteen orations of Cicero againſt Mark Antony.

PHILIPPINES, a religious ſociety of young women, at Rome; ſo called from their taking St. Philip de Neri for their protector.

They conſiſt of a hundred poor girls, who are brought up till they are of age to be married, or become nuns, under the direction of ſome religious women, who teach them to read, write, and work, and inſtruct them in the duties of Chriſtianty.

They wear a white veil, and a black croſs on their breaſts.

PHILLYREA, mock-privet, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped; it has ſcarce any tube, but the limb is divided into four revolute acute ſegments: it hath two ſtamina, and the fruit is a globoſe unilocular berry, incloſing one large round ſeed.

Phillyrea is an evergreen-ſhrub, and propagated either from ſeeds or layers, in autumn.

The leaves and bark of this ſhrub are ſaid to be aſtringent, and good in ulcers of the mouth; but they are little regarded in the preſent practice.

PHILOLOGY, φιλολογια, a ſcience, or rather an aſſemblage of ſeveral ſciences, conſiſting of grammar, rhetoric, poetry, antiquities, hiſtory, and criticiſm.

PHILOMATHES, a lover of learning or ſcience.

PHILONIUM, in pharmacy, a kind of ſomniferous anodyne opiate, taking its name from Philo, the inventor.

PHILOSOPHER, φιλοσοφος, a perſon verſed in philoſophy; or one who makes profeſſion of, or applies himſelf to, the ſtudy of nature and morality. See the article Philosophy.

PHILOSOPHIC, or Philosophical, ſomething that relates to philoſophy. See the articles Philosophy and Philosopher.

PHILOSOPHICAL-Egg, among chemiſts, a thin glaſs body, or bubble, of the ſhape of an egg, with a long neck or ſtem, uſed in digeſtions.

PHILOSOPHY, φιλοσοφια, the knowledge or ſtudy of nature and morality, founded on reaſon and experience.

Philoſophy, among the ancients, was uſed in various ſenſes: for, 1. It ſometimes was uſed for univerſal knowledge, viz. of all things human and divine. 2. In a ſtricter notion, for the contemplation of nature only; and in this ſenſe, a philoſopher was called, by Plato, φιλος της φυσεως, i.e. a friend and lover of nature. 3. Sometimes for ethics, or the doctrine of manners, which we call moral philoſophy. 4. It included alſo the mathematical arts and diſcipline, eſpecially arithmetic and geometry. 5. The doctrine of exiſtence, or *being* in the abſtract, called metaphyſics. 6. For the knowledge τȣ πρωτȣ καλȣ, i.e. of the prime or chief good, viz. God; and this was their prima philoſophia, or theology. 7. It was ſometimes applied to logics or dialectics, which gave rules for reaſoning about the nature of things.

Philoſophy may be divided into three parts, intellectual, moral, and phyſical. The intellectual part comprizes logics and metaphyſics; the moral part contains the laws of nature and nations; and, laſtly, the phyſical part comprehends the doctrine of bodies animate or inanimate. Theſe, with their various ſubdiviſions, will take in the whole of philoſophy. See LOGICS, METAPHYSICS, ETHICS, POLITICS, &c.

Wolfius makes the three parts of philoſophy to be the doctrine of God, the human ſoul, and of bodies: however, when he ſubdivides, and comes to treat of the ſeveral branches ſeparately, his diviſions readily come under the three heads intellectual, moral, and phyſical, before-mentioned.

For the method of philoſophizing, or the rules for that purpoſe, as eſtabliſhed by Sir Iſaac Newton, See the article EXPERIMENTAL PHILOSOPHY.

PHIMOSIS, in medicine, a diſorder of the penis, in which the prepuſe is rendered ſo ſtrict or tenſe, that it cannot be drawn back over the glands.

PHLEBOTOMY, in ſurgery, the opening a vein with a proper ſharp-edged and pointed inſtrument of ſteel, in order to let out a proper quantity of blood, either for the preſervation or recovery of a perſon's health. See the article DISEASE.

PHLEGM, φλεγμα, in the animal œconomy, one of the four humours whereof the ancients ſuppoſed the blood to be compoſed. See the article BLOOD.

The chemiſts make phlegm, or water, to conſiſt of an elementary body, the characters of which are fluidity, inſipidity, and volatility: and yet quickſilver has all theſe, which nobody pretends to be phlegm. See the article WATER.

PHLEGMAGOGUES, in pharmacy, ſuch medicines as purge off phlegm: ſuch are hermodactils, agaric, turbith, jalap, &c. See the article HYDRAGOGUES.

PHLEGMATIC, among phyſicians, an appellation given to that temperament, or habit of body, wherein phlegm is predominant; which gives riſe to catarrhs, coughs, &c. See the articles CATARRH and COUGH.

PHLEGMON, in ſurgery, denotes an external inflammation and tumour, attended with a burning heat, &c. See the article INFLAMMATION.

PHLEUM, in botany, a genus of plants, the corolla of which conſiſts of two valves; and the ſeed, which is ſingle, is included within the calyx and corolla.

PHLOMIS, Jeruſalem ſage, in botany, a genus of plants, whoſe flower is monopetalous and labiated; the tube is oblong; the upper lip is ovate, compreſſed, forked, and incumbent; the under is trifid; the middle ſegment is large, bilobate, and obtuſe: it hath four triquetrous ſeeds placed in the bottom of the cup.

The leaves of this plant are accounted aſtringent and vulnerary.

PHLOX, baſtard lichnis, in botany, a genus of plants, whoſe flower is monopetalous and ſaucer-ſhaped; the tube is cylindraceous and longer than the cup, it is narrow at the baſe and incurved; the limb is plane, and divided into five roundiſh, equal, obtuſe ſegments, ſhorter than the tube: the fruit is an ovate trigonal capſule, having three cells, each containing an oval ſeed.

This genus is the ſame with the lychnidea of Dillenius.

PHŒNIX, in aſtronomy, one of the conſtellations of the ſouthern hemiſphere, unknown to the ancients, and inviſible in our northern parts: it is ſaid to conſiſt of thirteen ſtars.

It took its name from that of a famous bird among the ancients, but generally looked upon by the moderns as fabulous.

The ancients ſpeak of this bird as ſingle, or the only one of its kind: they deſcribe it as of the ſize of an eagle; its head finely creſted with a beautiful plumage, its neck covered with feathers of a gold colour, and the reſt of its body purple, only the tail white, and the eyes ſparkling like ſtars; they hold, that it lives five or ſix hundred years in the wilderneſs; that, when thus advanced in age, it builds itſelf a pile of ſweet wood and aromatic gums, and fires it with wafting of its wings, and thus burns itſelf; and that from its aſhes ariſes a worm, which in time grows up to be a phœnix.

PHŒNIX, the great-palm, or date, in botany, a tree which riſes to a great height; the ſtalks are generally full of rugged knots, which are the veſtiges of the decayed leaves; the trunk is not ſolid, the center being filled with pith, round which is a tough bark, full of ſtrong fibres while young, but as the tree grows old, this bark hardens and becomes ligneous; to this bark the leaves are cloſely joined, which in the center riſe erect, being cloſely folded or plaited together; but after they have advanced above the vagina, which ſurrounds them, they expand very wide on every ſide of the ſtem, and as the older leaves decay, the ſtalk advances in height: the leaves, when grown to a ſize for bearing fruit, are ſix or eight feet long, and may be termed branches, for the trees have no other; theſe have narrow long leaves, or pinnæ, ſet on alternately their whole length; the ſmall leaves, or lobes, are, toward the baſe, three feet long, and little more than an inch broad; they are cloſely folded together when they firſt appear, and are wrapped round with brown fibres, or threads, which fall off as the leaves advance, making way for them to expand; theſe never open flat, but are hollow like the keel of a boat, with a ſharp ridge on their outſide; they are very ſtiff, and when young, of a bright green, ending with a ſharp black ſpine.

Theſe trees have male flowers on different plants from thoſe which produce the fruit; and there is a neceſſity for ſome of the male trees to grow near the female ones, to render them fruitful, or at leaſt to impregnate the ovary of the ſeed, without which, the ſtones which are taken out of the fruit will not grow. Moſt of the old authors who have mentioned this trees, affirm, that unleſs the female, or fruit-bearing palm-trees, have the aſſiſtance of the male, they are barren; therefore, in ſuch places where there are no male trees near the female, the inhabitants cut off the bunches of male flowers, when they are juſt opened, and carry them to the female trees, placing them on the branches near the female flowers to impregnate them, which they all agree has the deſired effect, rendering the trees fruitful which would otherwiſe have been barren.

Labat, in his account of America, mentions a ſingle tree of this kind growing near a convent, in Martinico, which produced a great quantity of fruit, that came to maturity enough for eating; but as there was no other tree of this kind in the iſland, they were deſirous of propagating it, and accordingly planted great numbers of the ſtones, for ſeveral years, but not one of them grew; therefore, after having made ſeveral trials without ſucceſs, they were obliged to ſend to Africa, where theſe plants grew in plenty, for ſome of the fruit; the ſtones of which they planted, and raiſed many plants. He then conjectures, that the ſingle tree, before-mentioned, might be probably ſo far impregnated by ſome neighbouring palm-tree of other ſpecies, as to render it capable of ripening the fruit, but not ſufficient to make the ſeeds prolific.

The flowers of both ſexes come out in very long bunches from the trunk, between the leaves, and are covered with a ſpatha, or ſheath, which opens and withers; thoſe of the male have ſix ſhort filaments, with narrow four-cornered antheræ, filled with farina; the female flowers have no ſtamina, but have a roundiſh germen, which afterwards becomes an oval berry, with a thick pulp, incloſing a hard oblong ſtone, with a deep furrow, running longitudinally.

Theſe plants grow in great plenty in Africa, alſo in Arabia, Syria, Perſia, and Greece. The dates, or fruit of the palm, are diſtinguiſhed according to their degrees of ripeneſs; thoſe are beſt which are large, full, fat, and of a yellowiſh colour: they are ſomewhat aſtringent until thoroughly ripe, and are then much of the ſame nature as figs.

They are ſaid to be good in hoarſeneſs, infarctions of the lungs, and ſandy obſtructions of the reins and bladder; they ſtrengthen the ſtomach, ſtop looſeneſſes, and corroborate the inteſtines: they are alſo good in diſeaſes of the breaſt; and the ſtones are reckoned very diuretic, and good in ſtranguries. Outwardly, dates are uſed ſometimes in ſuppurative cataplaſms.

PHOLAS, a ſhell-fiſh of the multivalve kind, compoſed of five pieces, three of which are very ſmall, ſo that they ſeem, to a ſuperficial obſerver, to be made up of only two ſhells.

PHOLIS, in natural hiſtory, a name given to the gypſums of a bright appearance.

PHONICS, φωνιχη, the doctrine or ſcience of ſounds, otherwiſe called acouſtics. See the article Sound.

PHOSPHORUS, in phyſiology, a denomination given to all bodies which ſhine and ſeem to burn, without having any degree of heat.

Chemiſtry, ſays Dr. Shaw, hath ſcarce afforded any thing more ſurpriſing than the common phoſphorus. To ſee letters traced with this matter become luminous in the dark, images and the bodies of men to blaze with light, and abundance of the like experiments, performed by means of phoſphorus, muſt awaken the curioſity of thoſe who have ſeen theſe experiments, and render them deſirous of being acquainted with the method of preparing it. The preparation, even to this day, is kept as a ſecret in few hands, and the matter ſold at a very high price. Whence we apprehend, it would be no unacceptable preſent to the world, to render this commodity cheaper, and diſcover its farther uſes.

The ſucceſsful method of preparing the phoſphorus of urine, is this: evaporate any quantity of freſh urine over a gentle fire, to a black and almoſt dry ſubſtance; then, with two pounds thereof, thoroughly mix twice its weight of fine ſand; put this mixture into a ſtrong-coated ſtone long-neck; and having poured a quart or two of clear water into a large receiver, join it to the long-neck, and work it in a naked fire: let the heat be ſmall for the firſt two hours; then increaſe it gradually to the utmoſt violence; and continue this for three or four hours ſucceſſively: at the expiration of which time, there will paſs into the receiver a little phlegm and volatile ſalt, much black and fœtid oil, and, laſtly, the matter of phoſphorus, in form of white clouds, which either ſtick to the ſides of the receiver, like a fine yellow ſkin, or fall to the bottom in form of ſmall ſand. Now let the fire go out, but let the receiver continue till all be cold, leſt the phoſphorus take fire on admiſſion of the air.

To reduce theſe ſmall grains into one piece, put them into a little tin ingot-mould, with water; heat the ingot to make the grains melt together; then add cold water, till the matter is congealed into one ſolid ſtick, like bees-wax; which being cut into ſmall pieces fit to enter the mouth of a vial, may be preſerved by water, and keeping the glaſs cloſe ſtopped. If the glaſs were not to be ſtopped, the phoſphorus would turn black on its ſurface, and at length be ſpoiled.

PHOTINIANS, a ſect of Chriſtians in the fourth century, ſo called from Photinus, their chief, who was biſhop of Sirmich, and maintained that Jeſus Chriſt was true man, but not true God, nor born before all ages; and that he only began to be Chriſt when the Holy Ghoſt deſcended upon him in the river Jordan. Theſe doctrines were condemned in ſeveral aſſemblies, and particularly by the Arians, in a ſynod held at Sirmich in the year 351.

PHRASE, *φρασις*, in grammar, a manner of ſpeech peculiarly adapted to certain occaſions, arts, languages, &c.

Sometimes the term phraſe is uſed for a ſhort ſentence. See SENTENCE.

PHRASEOLOGY, in matters of literature, a collection of the phraſes, and elegant expreſſions, in any language.

PHRENETIC VESSELS, in anatomy, the nerves, arteries, and veins which are ſpread over the diaphragm. The phrenetic nerves ariſe from the cervival ones; the phrenetic arteries ariſe out of the deſcending aorta, and are diſtributed through the diaphragm and pericardium; and the two phrenetic veins diſcharge their contents into the vena cava.

PHRENSY, *φρενιτις*, in medicine, an inflammation of the membranes of the brain, attended with an acute fever and delirium.

This diſeaſe, ſays Arbuthnot, requires the ſpeedieſt applications of all others; profuſe hæmorrhages of the noſe often reſolve it; and copious bleeding in the temporal arteries, is the moſt efficacious remedy. The diet ſhould be water-gruel, acidulated; and the drink barley-water, ſmall-beer, or the decoction of tamarinds.

According to Boerhaave, varices of the veins, or the bleeding piles, are beneficial; a looſeneſs is likewiſe good; and a violent cough, or hæmorrhage, often put an end to the diſeaſe. He therefore adviſes plentiful bleeding, through a large orifice, or to open ſeveral veins at the ſame time, as the jugular, frontal, and a vein in the foot.

PHRYMA, in botany, a genus of plants, producing monopetalous ringent flowers; the tube of the corolla is the ſame length with the cup; the upper lip is ſhort, ovate, and emarginated, and the under one is large, patent, and trifid; there is no pericarpium, but the cup, which is furrowed and connivent, contains a ſingle oblong ſeed, furrowed on one ſide.

PHTHIRIASIS, *φθειριασις*, in medicine, the pedicularis morbus, or louſy diſeaſe, is moſt incident to children, though adults are not wholly exempt from it.

Cleanneſs and wholeſome food are beſt for preventing this diſorder, which may be cured by waſhing the body with a lixivium of wormwood, ſtaves-acre, leſſer centaury, and oak-aſhes; adding ſome common ſalt. All the bitters, ſour and ſalt things, are here recommended; as is alſo mercury, which infallibly deſtroys theſe vermin; but it ought to be uſed with great caution, even by adults, and ſhould never be uſed in applications to children.

Etmuller adviſes the head to be waſhed with a lixivium, in which has been boiled the ſeeds of ſtaves-acre, and afterwards anointed with a liniment made of two drams of oil of ſpike, half an ounce of the oil of bitter almonds, and ſix drams of the oil of tobacco, which will deſtroy thoſe animals in one night's time. The powder of Indian berries, ſprinkled on the head, alſo effectually deſtroys them. Black ſoap is an infallible remedy for deſtroying crab-lice lodged in the groins of adults.

PHTHISIS, *φθισις*, a ſpecies of conſumption, ariſing from an ulcer of the lungs. See the article CONSUMPTION.

PHYGETHLON, in ſurgery, a broad, but not much elevated tumour, of the ſame nature with the bubo. See the article BUBO.

PHYLACTERY, in antiquity, a charm, or amulet, which being worn, was ſuppoſed to preſerve people from certain evils, diſeaſes, and dangers. See the article AMULET.

The Jews were remarkable for wearing phylacteries of parchment, in the form of ſlips or rolls, wherein were written certain paſſages of the law: theſe they wore upon their foreheads, and upon the wriſts of their left arms. The modern Jews think themſelves under no obligation to this practice, which they obſerve only at morning prayers.

PHYLICA, in botany, a genus of plants, whoſe flowers are collected in a diſc; the proper ones are compoſed of five acuminated ſquamulæ, with five ſmall ſtamina. The fruit is a roundiſh trilobate capſule, having three cells, each containing a roundiſh ſolitary ſeed, gibbous on one ſide, and anglular on the other.

PHYLLANTHUS, in botany, a genus of plants, producing male and female flowers, which have no petals; the cup is monophyllus, bell-ſhaped, and divided into ſix ſegments, and contains in the male flower three filaments, which join at the baſe, ſpreading aſunder at the top, and terminated with twin antheræ; the female flower has an angular nectarium ſurrounding the germen. The fruit is a roundiſh three-furrowed capſule, with three cells, each containing a ſingle roundiſh ſeed.

PHYLLIS, in botany, a plant which riſes with a ſoft ſhrubby ſtalk about two or three feet high, of an herbaceous colour, and full of joints, ſending out ſeveral ſmall ſide branches towards the top; theſe are furniſhed with ſpear-ſhaped leaves, of a lucid green on their upper ſide, but pale underneath; they have no foot-ſtalk, but ſit cloſe to the branches by threes. The flowers are produced at the end of the branches in looſe panicles; they are ſmall, and of an herbaceous colour, and cut into five parts to their baſe, and reflexed. The fruit is of a turbinated, obtuſe, angular figure, which ſplits in two parts when ripe, each containing one ſeed, flat on the inſide, and convex and angular on the outſide. It flowers in June, and the ſeeds ripen in autumn.

This plant is the bupleuroides of Boerhaave, and the valerianella of Dillenius.

PHYLLONA, in botany, a genus of moſſes, conſiſting only of a thin membranaceous matter, reſembling in ſome degree a leaf; whence the name. See the article MOSS.

PHYSIC, φυσικη, the ſame with medicine. See MEDICINE.

PHYSIC-NUT, in botany. See the articles JATROPHA and CROTON.

PHYSICAL, ſomething relating to nature. See the articles NATURE and NATURAL PHILOSOPHY.

PHYSICIAN, a perſon who profeſſes medicine, or the art of healing diſeaſes.

PHYSICS, a denomination ſometimes given to natural philoſophy. See the article NATURAL PHILOSOPHY.

PHYSIOGNOMONICS, among phyſicians, denotes ſuch ſigns as being taken from the countenance, ſerve to indicate the ſtate, diſpoſition, &c. both of the body and mind: and hence the art of reducing theſe ſigns to practice is termed phyſiognomy, than which nothing can be more precarious, in ſo far as it reſpects the characters of people, accuſtomed by education and practice to diſſemble their ſentiments.

PHYSIOLOGY, properly denotes a diſcourſe of nature, and natural bodies; or, it is that part of natural philoſophy which treats of the various phænomena of nature in a ſcientifical and ſpeculative way; in which ſenſe, neither chemiſtry nor experimental philoſophy are included under it. However, as experiments ought always to precede any reaſonings concerning the natures and properties of natural bodies, we have given the rules to be obſerved in drawing concluſions from them under the article EXPERIMENTAL PHILOSOPHY.

If we take a view of the ſeveral phænomena, and compare them together, we may obſerve ſome likeneſs and conformity between them. For example, in the falling of a ſtone to the ground, in the riſing of the ſea towards the moon, in coheſion and cryſtallization, there is ſomething alike; namely, an union or mutual approach of bodies: ſo that any one of theſe, or the like phænomena, may not ſeem ſtrange or ſurpriſing to a man who has nicely obſerved and compared the effects of nature: for that only is thought ſo which is uncommon, or a thing by itſelf, and out of the ordinary courſe of our obſervation. That bodies ſhould tend towards the center of the earth is not thought ſtrange, becauſe it is what we perceive every moment of our lives; but that they ſhould have a like gravitation towards the center of the moon, may ſeem odd and unaccountable to moſt men, becauſe it is diſcerned only in the tides; but as a philoſopher, whoſe thoughts take in a larger compaſs of nature, having obſerved a certain ſimilitude of appearances, as well in the heavens as the earth, that argue innumerable bodies to have a mutual tendency towards each other, which he denotes by the general name attraction, whatever can be reduced to that, he thinks juſtly accounted for; and thus he explains the tides by attraction. See the articles ATTRACTION and TIDE.

If therefore we conſider the difference there is betwixt natural philoſophers and other men, with regard to their knowledge of the phænomena, we ſhall find it conſiſts only in a greater largeneſs of comprehenſion; whereby analogies, harmonies, and agreements are diſcovered in the works of nature, and the particular effects explained; that is, reduced to general rules, which rules, grounded on the analogy and uniformneſs obſerved in the production of natural effects, are moſt agreeable and ſought after by the mind; for that, they extend our proſpect beyond what is preſent and near to us, and enable us to make very probable conjectures touching things that may have happened at very great diſtances of time and place, as well as to predict things to come; which ſort of endeavour towards omniſcience, is much affected by the mind.

Among phyſicians, the term phyſiology denotes the hiſtory of the human body and its ſeveral conſtituent parts, with their relations and functions.

PHYTEUMA, in botany, a genus of plants whoſe flower is monopetalous and ſtellated, with five filaments topped with oblong antheræ. The fruit is a roundiſh trilocular capſule, containing many roundiſh ſmall ſeeds.

PHYTOLACCA, American nightſhade, in botany, a genus of decandrious plants, whoſe flower conſiſts of five roundiſh, concave, ſpreading, perſiſtent petals: the fruit is an orbiculated depreſſed berry, with ten longitudinal furrows, and the ſame number of cells, each containing a ſmooth kidney-ſhaped ſeed. It is very common in our North-American plantations; and is cultivated in England for the beauty of its flowers: it may be propagated by ſowing the ſeeds in the ſpring upon a bed of light rich earth, and when the plants are come up, they ſhould be moved into the borders of large gardens, allowing them room enough to grow, for they become very large. The planters take a ſpoonful or two of the juice of the root as a purge, and that very frequently. The berries are full of a purple juice, which gives a fine tincture to paper, but will not laſt long, if there could be a method of fixing the dye, it might be made very uſeful.

PHYTOLOGY, a diſcourſe concerning the kinds and virtues of plants.

PIA MATER, in anatomy, the third tunic or membrane of the brain, placed immediately under the tunica arachnoides, and cloſely and firmly connected to the brain: it not only extends over the whole ſurface of the brain, but inſinuates itſelf into all its cavities, and is carried down to the bottom of all its furrows. It covers alſo the ſpinal marrow, and all the nerves, and adheres alſo to the tunica arachnoides very cloſely and firmly, in the upper part of the head; but much leſs ſo below, with the dura mater.

PIASTER, a Spaniſh coin, more ordinarily called a piece of eight.

PICA, in zoology, the largeſt animal of the mus, or mouſe-kind, being as big as a pig of a week old: it is of a brown colour ſpotted with grey, and with a white belly; the upper lip is divided, and a little longer than the under one; the ears are ſhort, and obtuſe; the body is thick and fleſhy, and the legs ſhort, eſpecially the fore ones.

Pica, in medicine; a depravation of appetite, which makes the patient long for what is unfit for food, or incapable of nouriſhing, as chalk, aſhes, coals, plaſter, lime, &c.

PICARDS, a ſect ſo called from their leader, one Picard, a Fleming, who, about the beginning of the fifteenth century, improved upon the error of the Adamites, in reſpect to nakedneſs; and who pretended that he was ſent into the world, as another Adam, to reſtore the law of nature, which, he ſaid, conſiſted principally of two things, a community of women, and a nakedneſs of all the parts of the body.

PICKAGE, or Piccage, an antient cuſtom or duty paid at fairs and markets, for breaking the ground, and pitching up ſtalls or ſtandings.

PICKLE, a brine or liquor, commonly compoſed of ſalt, vinegar, &c. ſometimes with the addition of ſpices, wherein meat, fruit, and other things are preſerved and ſeaſoned. The ſame name is alſo given to any vegetable production prepared in pickle.

The methods of pickling the various ſorts of vegetables, and even thoſe of the ſame kind, are very different: we ſhall therefore content ourſelves with giving one out of the numerous methods of pickling walnuts: Take walnuts before the ſhell is grown hard, ſcald them, and rub off the outer ſkin; then put them into water and ſalt for nine or ten days, ſhifting them every other day, and keeping them cloſe covered from the air; then dry them, and prepare the pickle as follows: for half a hundred of large walnuts, take two quarts of white-wine vinegar; long pepper, black-pepper, and ginger, of each half an ounce; cloves, mace, and nutmegs, of each a quarter of an ounce: pound the ſpice, and with it a ſpoonful of muſtard-ſeed; ſtrew this between every layer of walnuts, pour the liquor boiling hot upon them, and keep them cloſe ſtopped.

PIQUEERING, Pickeering, or Pickerooning, a flying war or ſkirmiſh made by ſoldiers detached from two armies by pillage, or before a main battle begins.

PICQUET, a celebrated game at cards played between two perſons, with only thirty-two cards; all the duces, threes, fours, fives and ſixes being ſet aſide.

PICRIS, in botany, a genus of plants, whoſe flower conſiſts of a double cup, with a compound imbricated, uniform corolla; the proper flowers are hermaphrodite, monopetalous, ligulated, linear, truncated, and quinquedentated; there is no pericarpium, but the ſeeds, which are ſolitary, ſentricoſe, obtuſe, and crowned with down, are contained in the cup. This genus comprehends the helminthotheca of Vaillant.

PICTS-Wall, in antiquity, a wall begun by the emperor Adrian, on the northern bounds of England; to prevent the incurſions of the Picts and Scots. It was firſt made only of turf, ſtrengthened with paliſadoes, till the emperor Severus coming in perſon into Britain, built it with ſolid ſtone. This wall, part of which ſtill remains, begun at the entrance of Solway-frith in Cumberland, and running N. E. extended to the German ocean.

PICTURE, a piece of painting, or a ſubject repreſented in colours, on wood, convas, paper, or the like.

PIECE, in commerce, ſignifies ſometimes a whole, and ſometimes a part of the whole. In the firſt ſenſe, we ſay a piece of cloth or velvet, &c. meaning a certain quantity of yards regulated by cuſtom; being yet intire, and not cut. In the other ſignification we ſay a piece of tapeſtry; meaning a diſtinct member wrought apart, which, with ſeveral others, make one hanging.

Piece, in matters of money, ſignifies ſometimes the ſame thing with ſpecies; and ſometimes by adding the value of the pieces, it is uſed to expreſs ſuch as have no other particular name.

Piece is alſo a kind of money of account, or rather a manner of accounting uſed among the negroes on the coaſt of Angola in Africa. See the article Money.

Piece, in heraldry, denotes an ordinary or charge. See the article Ordinary.

Pieces, in the military art, include all ſorts of great guns and mortars. Battering pieces are the larger ſort of guns uſed at ſieges for making the breaches, ſuch as the twenty-four pounder, and culverine, the one carrying twenty-four, and the other an eighteen pound ball. Field-pieces are twelve-pounders; demiculverines, ſix-pounders, ſakers, minions, and three-pounders, which march with the army, and encamp always behind the ſecond line, but in the day of battle are in the front. A ſoldier's firelock is likewiſe called his piece.

PIEDOUCHE, in architecture, a little ſtand or pedeſtal, either oblong or ſquare, enriched with mouldings, ſerving to ſupport a buſt, or other little figure.

PIEDROIT, in architecture, a pier, or ſquare kind of pillar, part whereof is hid within a wall. The only thing wherein it differs from a pilaſter is, that the latter has a regular baſe and capital, which the other wants. See Pilaster.

This term is alſo uſed for part of the ſolid wall annexed to a door or window, comprehending the door-poſt, chambranel, tableau, leaf, &c.

PIEPOWDER-Court, or Pedes Pulveriſati, a court held in fairs for doing juſtice to buyers and ſellers, and redreſſing diſorders there committed.

PIER, or Peer, in building, denotes a maſs of ſtone, &c. oppoſed by way of fortreſs againſt the force of the ſea, or a great river, for the ſecurity of ſhips that lie at harbour in any haven.

It is alſo uſed in architecture for a kind of pilaſter, or buttreſs, raiſed for ſupport, ſtrength, and ſometimes for ornament.

PIERCEA, in botany, ſee the article Revinia.

PIERCED, Percé, in heraldry, is when any ordinary is perforated, or ſtruck through, ſhewing, as it were, a hole in it, which muſt be expreſſed in blazon, as to its ſhape: thus if a croſs have a ſquare hole, or perforation in the centre, it is blazoned ſquare-pierced, which is more proper than quarterly-pierced, as Leigh expreſſes it. When the hole or perforation is round, it muſt be expreſſed round-pierced; if it be in the ſhape of a lozenge, it is expreſſed pierced lozenge-ways. All piercings muſt be of the colour of the field, and when ſuch figures appear on the centre of a croſs, &c. of another colour, the croſs is not to be ſuppoſed pierced, but the figure on it is a charge, and muſt be accordingly blazoned.

PIETISTS, a religious ſect ſprung up among the proteſtants of Germany, ſeeming to be a kind of mean between the quakers of England, and the quietiſts of the Romiſh church. See the article Quakers, &c.

They deſpiſe all ſorts of eccleſiaſtical polity, all ſchool theology, and all forms and ceremonies, and give themſelves up to contemplation and the myſtic theology.

PIG, in zoology, the young of the hog kind. See the article Hog.

Pig *of Lead*, the eighth part of a fother, amounting to two hundred and fifty pounds weight.

PIGEON, in ornithology. See the article Columba.

Pigeon-House, a houſe erected full of holes within for the keeping, breeding, &c. of pigeons, otherwiſe called a dove-cote.

PIGMENTS, *Pigmenta*, preparations uſed by painters, dyers, &c. to impart colours to bodies, or to imitate particular colours.

PIGMY, or Pygmy. See Pygmy.

PIKE, an offenſive weapen, conſiſting of a ſhaft of wood, twelve or fourteen feet long, headed with a flat-pointed ſteel, called the ſpear. The pike was a long time in uſe among the infantry, to enable them to ſuſtain the attack of the cavalry, but it is now taken from them, and the bayonet, which fixes on at the end of the carabine, is ſubſtituted in its place. Yet the pike ſtill continues the weapon of foot-officers, who fight pike in hand, ſalute with the pike, &c.

PILASTER, in architecture, a ſquare column, ſometimes inſulated, but more frequently let within a wall, and only ſhewing a fourth or fifth part of its thickneſs.

The pilaſter is different in different orders: it borrows the name of each, and has the ſame proportions, and the ſame capitals, members and ornaments with the columns themſelves. Pilaſters are, however, uſually made without either ſwelling or diminution, and as broad at top as at the bottom; though ſome of the modern architects, as M. Manſard, &c. diminiſh them at the top, and even make them ſwell in the middle, like columns, particularly when placed behind columns.

PILE, in antiquity, a pyramid built of wood, on which the bodies of the deceaſed were laid in order to be burned.

Pile, in building, is uſed for a large ſtake rammed into the ground in the bottom of rivers, or in marſhy land, for a foundation to built upon.

Pile is alſo uſed among architects for a maſs of building.

Pile, in coinage, denotes a kind of puncheon, which, in the old way of coining with the hammer, contained the arms, or other figure, and inſcription, to be ſtruck on the coin.

Accordingly, we ſtill call the arms-ſide of a piece of money, the pile; and the head, the croſs; becauſe, in ancient coins, the croſs generally took the place of the head in ours: but ſome will have it called pile, from the impreſſion of a ſhip built on piles, ſtruck on this ſide our ancient coins.

Pile, in heraldry, an ordinary in form of a wedge, contracting from the chief, and terminating in a point towards the bottom of the ſhield.

Piles, in medicine, the ſame with hæmorrhoids. See the article Hæmorrhoids.

PILGRIMAGE, a kind of religious diſcipline, which conſiſts in taking a journey to ſome holy place, in order to adore the relics of ſome deceaſed ſaint.

Pilgrimages began to be made about the middle ages of the church; but they were moſt in vogue after the end of the eleventh century, when every one was for viſiting places of devotion, not excepting kings and princes themſelves; and even biſhops made no difficulty of being abſent from their churches on the ſame account.

The places moſt viſited were Jeruſalem, Rome, Compoſtella, and Tours; but the greateſt numbers now reſort to Loretto, in order to viſit the chamber of the Bleſſed Virgin, in which ſhe was born, and brought up her ſon Jeſus, till he was twelve years of age.

This chamber, it is pretended, was carried by angels into Dalmatia, about the year 1291, and afterwards, in the ſame manner, tranſported to Lorotto, where a magnificent cathedral is built over it. In this chamber is the image of the Bleſſed Virgin, almoſt covered with pearls and diamonds; and round the ſtatue, is a kind of rainbow formed of precious ſtones of various colours. Five hundred thouſand pilgrims ſometimes reſort to this houſe in one year, in order to pay their devotions before this glorious image.

The Mahometans are commanded in the Koran, to perform a pilgrimage to Mecca; this is one of the capital points of their religion, and therefore a prodigious cavalcade of pilgrims annually go thither, in the company of thoſe who are ſent with the grand ſeignor's preſents, to the tomb of Mahomet.

PILL, in pharmacy, a form of medicine reſembling a little ball, to be ſwallowed whole, invented in favour of ſuch as cannot take bitter and ill-taſted medicinal draughts, as alſo to keep in readineſs for occaſional uſe without decaying.

PILLAGE, among builders, is a ſquare pillar, ſtanding behind a column, to bear up arches.

PILLAR, in architecture, a kind of irregular column, round and inſulated, but deviating from the proportions of a juſt column.

Pillars are always either too maſſive, or too ſlender for regular architecture; ſuch are the pillars that ſupport Gothic vaults, or buildings; and, indeed, they are not reſtrained by any rules, their parts and proportions being arbitrary.

Butting-PILLAR, the ſame with a buttreſs. See the article BUTTRESS.

Square-PILLAR, a maſſive work, called alſo a pier, or piedroit, ſerving to ſupport arches, &c.

PILLAR, in the manege, is the center of the ring or manege-ground, round which a horſe turns, whether there be a pillar in it or not.

Beſides this, there are pillars in the circumference, or ſides of the manege-ground, placed at certain diſtances, by two and two; whence they are called the two pillars, to diſtinguiſh them from that of the center.

PILLORY, was anciently a poſt erected in a croſs-road, by the lord of the manor, with his arms upon it, as a mark of his ſeigniory, and ſometimes with a collar to fix criminals to.

At preſent it is a wooden machine, made to confine the head and hands, in order to expoſe criminals to public view, and to render them publicly infamous.

According to Sir Henry Spelman, it was at firſt peculiarly intended for the puniſhment of bakers, who ſhould be found faulty in the weight or fineneſs of their bread. At preſent, the perſons thus puniſhed, are foreſtallers, thoſe uſing falſe weights, perſons guilty of perjury, &c.

PILOT, a perſon employed to conduct ſhips over bars and ſands, or through intricate channels, into a road or harbour.

PILULARIA, in botany, a genus of ferns, the male fructifications of which grow in lines, like powder, under the leaf, and the female, towards the root, conſiſting of round polyſpermous cells.

PIMENTA, or *Pimento*, the all-ſpice tree, in botany; it grows naturally in Jamaica, to the height of thirty or more feet; the trunk is ſtrait, covered with a ſmooth brown bark, and divides upwards into many branches, which come out oppoſite, and are furniſhed with oblong leaves, like thoſe of the bay tree, both in form, colour, and texture, and placed oppoſite; theſe when bruiſed or broken emit a fine aromatic odour; the flowers are produced in large looſe bunches from the ſide of the branches toward their ends; the flowers are ſmall, and of an herbaceous colour, and are male or female on diſtinct plants. The male flowers have very ſmall petals, and a great number of ſtamina in each. The female flowers have an oval germen, ſupporting a ſlender ſtyle, crowned with a blunt ſtigma; the germen afterward becomes a globular, pulpy berry, with two cells each, containing a kidney-ſhaped ſeed. The unripe fruit of this tree makes a conſiderable branch of commerce, being the all-ſpice, ſo well known in Europe. They are gathered a little before they arrive to their full ſize, and are ſeparated from the leaves, ſtalks, or any thing which might accidentally be mixed with them, and expoſed every day to the ſun, ſpread on cloths, for a fortnight, to dry, frequently ſhaking and turning them, but are removed under cover every evening, to ſcreen them from the dews, and when thus dried, are packed up and exported.

Pimenta abounds with a fragrant eſſential oil, which is ſeparated, in great quantity, in diſtillation, and is ſo heavy that it ſinks in water.

This ſpice is much uſed in our foods, and ſometimes in medicine: it is, indeed, a very good aromatic, and ſo well imitates the mixed flavour of all the reſt, that it has long been a common practice to make the aqua marabilis, which was ordered to be diſtilled from all the ſpices, of this ingredient alone; and the taſte of the water thus made, when carefully done, is ſo near the genuine, that a very nice palate can only diſtinguiſh it.

The preſent college-diſpenſatory orders a ſimple water to be diſtilled from it, a gallon from half a pound of that ſpice, which is a better carminative than any of the former waters retained under that name.

PIMPERNEL, *Anagallis*, in botany. See the article ANAGALLIS.

PIMPINELLA, burnet-ſaxifrage, in botany, a genus of umbelliferous plants, the principal umbel is formed of many rays; the proper flowers contain five heartſhaped, inflexed petals, which are almoſt equal, it hath no pericarpium, but the fruir is ovate, oblong, and divided into two parts, containing two oblong furrowed ſeeds, convex on one ſide, and flat on the other. The common ſort, which grows wild in many parts of England, is ſaid to be detergent, vulnerary, and diuretic. This genus comprehends the tragoſelinum of Tournefort.

PIMPLE, in ſurgery, a ſmall puſtule, ariſing chiefly on the face. See the article PUSTULE.

PIN, in commerce, a little neceſſary implement, made of braſs wire, uſed chiefly by the women in adjuſting their dreſs.

PINASTER, in botany, a ſpecies of the pine tree. See PINE.

PINDARIC, in poetry, an ode formed in imitation of the manner of Pindar.

The Pindaric manner is diſtinguiſhed by the boldneſs and height of the flights, the ſuddenneſs and ſurpriſingneſs of the tranſitions, and the ſeeming irregularity, wildneſs, and enthuſiaſm of the whole.

The only part remaining of Pindar's works, is a Book of Odes, all in praiſe of the victors at the Olympian, Pythian, Nemæan, and Iſthmian, games: whence the firſt is intitled the Olympians; the ſecond, the Pythians; the third, the Nemæans; and the fourth, the Iſthmians.

PINE, *Pinus*, in botany, a genus of ever-green trees, the leaves of which come out of ſmall ſheaths, in pairs in ſome ſpecies, and in others by threes or fives; they are of a bluiſh-green colour, and placed, for the moſt part, on every ſide of the branches; the flowers are male and female, growing on the ſame tree, and are both deſtitute of a corolla; the male flowers are collected in a bunch, and contain many ſtamina connected in a column at their baſe, but dividing at the top: the female flowers are collected in a common, almoſt oval, cone, and ſtand at a diſtance from the male on the ſame tree, the ſcales of which are biflorous, oblong, imbricated, and perſiſtent, under which a ſmall germen is placed, ſupporting a ſubulated ſtyle, crowned with a ſingle ſtigma, which becomes an oblong oval nut, crowned with a membranaceous wing, and included in the rigid ſcale of the cone.

There are ſeveral ſpecies of pine trees, which are raiſed for ſale in the nurſeries, but the moſt valuable are, what is commonly called the Scotch fir, and a North American ſpecies, known among the gardeners here, by the name of lord Weymouth's pine, the former of which grows naturally on the mountains of Scotland, alſo in Denmark, Norway, and Sweden, the leaves of which grow out of a ſheath in pairs, which are twiſted, and are of a greyiſh colour: it will grow on almoſt any ſoil, and the timber of it is the moſt durable of any kind of pines yet known, the beſt yellow deals being the wood of this tree.

The lord Weymouth's pine grows naturally in moſt parts of North America; it is one of the talleſt trees of all the ſpecies, often growing to a hundred feet high in thoſe countries; the bark is very ſmooth, the leaves are long and ſlender, five growing out of each ſheath, the branches are pretty cloſely furniſhed with them, ſo makes a fine appearance; the cones are long, ſlender, and very looſe, opening with the firſt warmth of the ſpring, ſo that if they are not gathered in the winter, the ſeeds will be ſhed: the wood of this ſort is much eſteemed for making maſts for ſhips, &c. This ſort, and the Scotch pine, are the beſt worth cultivating of all the kinds, for the ſake of their valuable timber. All the ſorts of pine trees are raiſed from the ſeeds taken out of their polyſpermous cones: the way to get them out is, by expoſing the cones to a gentle fire, which will cauſe the cells to open, and then the ſeeds may be eaſily taken out, but this ſhould not be done until the ſeaſon is arrived for ſowing, which is about the middle of March, and when the ſeeds are ſown, they ſhould be protected by nets from the birds, otherwiſe they will be in danger of being deſtroyed when they firſt come up, for as they bring up the huſks on the top of the plants, the birds will pick off the heads of the plants, whereby they are deſtroyed, unleſs carefully guarded againſt. If the quantity of ſeeds to be ſown is few, they may be raiſed in pots or boxes, but if large, ſo as to require a good ſpace to receive them, then they may be ſown on an eaſt or north-eaſt border, where they may be ſcreened from the ſun, and thoſe which are ſown in pots or boxes, ſhould be placed in a ſhady ſituation, here they may remain till the ſpring following, when they ſhould be tranſplanted into the nurſery, at the diſtance of ſix or eight inches aſunder, where they may remain two years, and afterward tranſplanted, where they are to continue for good.

The Scotch pine being the hardieſt of all the kinds, and the wood of it the moſt uſeful (as was before obſerved) is the ſort which beſt deſerves our notice; this will thrive upon the moſt barren ſands, where ſcarce any other plants will grow, except heath and furze; and as there are many thouſand acres of ſuch land, lying convenient for water-carriage, in this kingdom (and is at preſent of little uſe to any one) it might be ſo improved by plantations of theſe trees, as to become good eſtates to the proprietors of ſuch lands, and alſo a national benefit; and, as the legiſlature has taken this into conſideration, and have already paſſed ſome laws for the encouragement of theſe plantations, and alſo for their preſervation and ſecurity; ſo it may be hoped, that this will be undertaken by the gentlemen who are poſſeſſed of ſuch lands, in all the different parts of this kingdom, with proper ſpirit; for although they may not expect to receive much profit from theſe plantations in their own time, yet their ſucceſſors may, with large intereſt: and the pleaſure which theſe growing trees will afford them, by beautifying the preſent dreary parts of the country, will, in ſome meaſure, recompence them for their trouble and expence.

To this genus Linnæus has added the fir and larch trees; which ſee. From the wild pine or pineaſter is procured the common turpentine; and the kernels of the nuts of the manured or ſtone-pine are of a balſamic nouriſhing nature, and good for conſumptions, coughs, and hoarſneſs; they are reſtorative, and of ſervice after long illneſs.

PINE-APPLE, *Ananas*, in botany. See the article ANANAS.

Ground-PINE, in botany. See the article CHAMÆPITYS.

PINEAL GLAND, in anatomy, a gland in the third ventricle of the brain; thus called from its reſemblance to a pine-apple.

It is of a greyiſh colour, and its proceſſus and baſe are often medullary: this gland has often by many been ſuppoſed the peculiar ſeat of the ſoul.

PINGUICULA, butter-wort, in botany, a genus of plants, whoſe flower is monopetalous and ringent, the longer lip of which is ſtraight, obtuſe, trifid and ſupine; the ſhorter lip is bifid, more obtuſe, and ſpreading: it hath a corniculated nectarium, produced from the baſe of the petal: the ſtamina are two cylindric curved filaments, topped with roundiſh antheræ; and the fruit is an ovate capſule, compreſſed at the top, having one cell, which contains many cylindraceous ſeeds, with a looſe receptacle.

This genus grows wild in boggy lands in divers parts of England.

PINION, in mechanics, an arbor, or ſpindle, in the body whereof are ſeveral notches, that catch the teeth of a wheel that ſerves to turn it round: or it is a leſſer wheel which plays in the teeth of a larger.

In a watch, &c. the notches of a pinion, which are commonly 4, 5, 6, 8, &c. are called leaves, and not teeth, as in other wheels.

PINK, in botany, the Engliſh name for ſeveral beautiful ſpecies of dianthus, much cultivated in our gardens; the principal of which are, the pheaſant's-eye pink, with double and ſingle flowers; the common red pink, the cob pink, Dobſon's pink, white cob pink, the painted-lady pink, the China pink, &c. They are all propagated by ſlips, layers, or from ſeed.

The beſt time for planting the ſlips of pinks is in July or Auguſt, taking the opportunity of moiſt weather: the China or Indian pink is propagated from ſeeds, which ſhould be ſown upon a gentle hot bed about the beginning of April, and in about three weeks or a month the plants will be up, and ſtout enough to remove; they ſhould then be taken up, with a ball of earth to their roots, and planted in a bed of rich mould, at about three inches aſunder, and in dry weather muſt be frequently watered; the farther care is to keep them from being over-run with weeds, till June, at which time they may be tranſplanted to the place where they are deſigned to remain for flowering. If they are taken up with large balls to their roots (as before directed) they will not be injured by their removal; and as they grow not very large, it is beſt to plant them in beds, at about eight inches aſunder, where they will make a more beautiful appearance than intermixed with other flowers, there being a fine contraſt among theſe flowers, as ſcarce any two are marked alike; for no ſort of plant produces ſuch varieties of rich-coloured flowers as theſe do, which annually vary when raiſed from ſeeds.

As all the different kinds of pinks are either ſpecies or varieties of the dianthus (which comprehends the carnations and ſweetwilliams alſo) we muſt therefore refer the reader to the article CARNATION for the generical characters of theſe plants.

PINNACLE, in architecture, the top or roof of a houſe, terminating in a point.

This kind of roof, among the ancients, was appropriated to temples; their ordinary roofs were all flat, or made in the platform way. It was from the pinnacle that the form of the pediment took its riſe.

PINNATED LEAVES, *Pinnata Folia*, in botany, thoſe which are compoſed of ſeveral folioles, or partial leaves, connected to the ſides of a petiole, in the form of wings.

Of pinnated leaves there are ſeveral kinds, as 1. the pinnated with an odd one, that is, when it is terminated with an odd foliole; 2. the cirrhoſe-pinnated leaf, when it is terminated with a tendril or claſper; 3. an abrupt-pinnated leaf, when it is terminated neither by a foliole or cirrhus; 4. the oppoſitely-pinnated, is when the folioles, or lobes, ſtand oppoſite on the mid-rib or petiole; 5. the alternately-pinnated, when the folioles are produced alternately; 6. the interruptedly-pinnated, when the folioles are alternately leſs; 7. the articulately-pinnated, when the petiole, common to all the folioles, is jointed; 8. the decurſively-pinnated, when the folioles run along the petiole from one to another; 9. the conjugate-pinnated, when the leaf conſiſts but of two folioles only on the petiole; 10. Bepinnate on duplicato pinnated, when the footſtalk is divided, and each diviſion ſuſtains ſeveral folioles ranged on their ſides like wings; 11. triplicato-pinnate, expreſſes a leaf, the petioles of which ſend out three alated diviſions, before it has any folioles on it; theſe laſt are terminated ſometimes by two folioles each, and in that caſe are ſaid to be abrupt; ſometimes by an odd foliole, and are then called triplicato-pinnata cum impari.

PINNING, in building, the faſtening of tiles together, with pins of heart of oak, for the covering of a houſe, &c.

PINT, a veſſel, or meaſure, uſed in eſtimating the quantity of liquids, and even ſometimes of dry things. See the article MEASURE.

PINTLE, among gunners, an iron, which ſerves to keep the guns from recoiling.

PINUS, the pine-tree, in botany. See the article PINE.

PIONEER, in the art of war, a labourer employed in an army to ſmooth the roads, paſs the artillery along, and dig lines and trenches, mines, and other works.

PIONY, in botany. See the article PÆONY.

PIP, or PEP, *Pepia*, a diſeaſe among poultry, conſiſting of a white thin ſkin, or film, that grows under the tip of the tongue, and hinders their feeding. It uſually ariſes from want of water, or eating filthy meat. It is cured by pulling off the film with the fingers, and rubbing the tongue with ſalt. Hawks are particularly liable to this diſeaſe, eſpecially from feeding on ſtinking fleſh.

PIPE, in building, &c. a canal, or conduit, for the conveyance of water and other liquids. Pipes for water, water-engines, &c. are uſually of lead, iron, earth, or wood: the latter are uſually made of oak or elder. Thoſe of iron are caſt in forges, their uſual length is about two feet and a half; ſeveral of theſe are commonly faſtened together by means of four ſcrews at each end, with leather or old hat between them, to ſtop the water. Thoſe of earth are made by the potters; theſe are fitted into one another, one end being always made wider than the other. To join them the cloſer, and prevent their breaking, they are covered with tow and pitch: their length is uſually about that of the iron-pipes. The wooden pipes are trees boared with large iron augres, of different ſizes, beginning with a leſs, and then proceeding with a larger ſucceſſively; the firſt being pointed, the reſt being formed like ſpoons, increaſing in diameter, from one to ſix inches or more.

PIPE alſo denotes a veſſel or meaſure for wine, and things meaſured by wine-meaſure. See the article MEASURE.

PIPE, in mining, is where the ore runs forwards end-ways in a hole, and doth not ſink downwards, or in a vein.

PIPE-TREE, in botany, a name given ſometimes to the ſyringa or philadelphus. See the article PHILADELPHUS.

PIPER, pepper, in botany. See PEPPER.

PIPPS, among floriſts, are the diſtinct flowers of ſuch plants which grow in truſſes or bunches, and is particulurly applied to auriculas and polyanthuſes.

PIQUETTES, among floriſts, a kind of carnations; they have always a white ground, and ſpotted or pounced with red, ſcarlet, purple, or other colours. See the article CARNATION.

PIRATE, PYRATE, or ROVER, *Pirata*, a perſon, or veſſel, that robs on the high ſeas, without permiſſion or authority of any prince or ſtate.

When a pirate enters into any port or haven, and there robs a merchant's ſhip, this is not held to be piracy, becauſe it is not done on the high ſea, but it is a robbery at common law. In caſe a ſhip is riding at anchor on the ſea, and it happens that the mariners or ſeamen are part in their boat, and the reſt on ſhore, by which accident none are left in the ſhip; here, if a pirate ſhall attack her, and commit a robbery, the ſame is piracy. Nevertheleſs, the taking, by a ſhip at ſea, in great neceſſity of victuals, cables, ropes, &c. ſuch things out of another veſſel, is not ſo, where that other veſſel can ſpare ſuch things, and the takers pay or give ſecurity for them. The manner of trying a pirate, is by a ſpecial commiſſion, directed to the lord high admiral, &c. and the offence of piracy may be heard and determined, as if the robbery was committed on land; and offenders ſhall ſuffer the like pains of death, loſs of lands and goods, &c. Perſons combining to yield up ſhips to pirates, or to lay violent hands on the commanders of ſhips, or that correſpond with any pirate, are adjudged guilty of piracy. All the proper goods of pirates are granted to the lord high admiral by patent; but not their piratical goods, which, where the owner is not known, belong to the king.

PISCES, in aſtronomy, the twelfth ſign or conſtellation of the zodiac.

The ſtars in piſces, in Ptolemy's catalogue, are 38; in Tycho's, 33; in the Britannic catalogue 109. The longitudes, latitudes, magnitudes, &c. are as follow. See plate LXXIV.

Names and Situations of the Stars.	Signs.	Longitude. ° ′ ″	Latitude. ° ′ ″		Magn.
	♓	11.56.33	7.22.49	B	7
		12.56.36	6.51.40	B	6
		12.55. 9	6. 1. 9	B	6
In the mouth of the ſouth. fiſh		15. 6.17	9. 3.19	B	4
		15.31.39	7. 1.31	B	6
5.					
South. of the 2 in the hind part of the head		17.54. 5	7.16.43	B	4
North. in the hind-part of the head		19.32.38	8.52.36	B	5 6
Preced. of 2 in the belly		19.24.54	4.26.26	B	5
3					

Names and Situations of the Stars.	Signs.	Longitude.	Latitude.		Magn.
		° ′ ″	° ′ ″		
A ſmall one contig. to it	♓	19.25.41	4.16.40	B	6 7
Preced. in the back		21.42.48	9. 1.58	B	5
10.					
		18.46..8	1.22.54	B	6
		19. 6.26	2. 4.20	B	6
		19.38.49	1.46.36	B	6
		20. 4.19	1.24.53	B	6
		21.25. 4	3.37.54	B	6
15.					
		21.56. 7	4.15.34	B	6
Subſeq. in the back		24. 8.59	7.12.12	B	5
Subſeq. of two in the belly		23. 6.57	3.25. 7	B	5
		26.50.32	11. 7.22	B	7
		24.41.16	4.32.43	B	5 6
20.					
Firſt of thoſe preced. the ſquare under the ſouth. fiſh		22.38.42	1.19.43	A	6 7
		24.31.28	2. 1.47	B	6
		25.50. 5	3.28.57	B	6
Second		23.38. 5	2.11.39	A	6 7
		28.13.11	6.58.13	B	6
25.					
Preced. of north. in the ſquare		24.47.55	3. 7.49	A	5
In the tail of the ſouth. fiſh		29. 5.16	6.22.15	B	5
Sub. of the north. in the ſquare		25.43.25	2.57.45	A	5
Preced. of the north. in the ſquare		24.32.57	5.42.33	A	5
	♈	39.33	7.57.50	B	6
30.					
That which follows over the tail		29. 6	7.31.43	B	5 6
Subſeq. the ſouth. of thoſe in the ſquare under Piſces	♓	25.26.59	5.46.55	A	5 4
	♈	3.16.44	9.12.37	B	6
		3.27.37	6.36. 3	B	9
		3.35.29	5.54.26	B	6
35.					
		5.54.27	11. 5.36	B	6
		4. 1.59	6.24. 2	B	7
		7. 9. 6	13.12. 4	B	6
		7.36.39	12.55. 3	B	6
In the line next the tail of Piſces		4.29.37	5.27.36	B	6
40.					
		6.59. 9	10. 9. 8	B	6
		7.51.34	10.41.48	B	6
		3. 6.31	44.39	A	6
		5.27.16	4.30.42	B	6
		10.48. 1	15. 6.45	B	6
45.					
		10. 7. 4	13.37.31	B	6
		9.33.52	12.16.56	B	7
		9.59. 8	11.39.13	B	7
Second from the tail in the line		6.40. 3	3.10.38	B	6
		12. 9.17	15.23.53	B	6
50.					
		10.59. 8	10.21.41	B	7
		14.16. 1	15.43.24	B	7
		13.17. 3	9.38.42	B	6
		11.59.10	5.22.25	B	7
		15. 6.57	13.19.58	B	7
55.					

Names and Situations of the Stars.	Signs.	Longitude. ° ′ ″	Latitude. ° ′ ″		Magn.
	♈	10. 2.43	1.31.48	B	7
		15.47.59	14.30.43	B	7
		10.27.52	1.57.28	B	7
Preced. of the bright ſtars in the line		10.39.38	2. 9.44	B	4
		14.24.23	10.44.49	B	6
60. Preced. of 3 in the head of the north fiſh		19. 8. 8	20.30.33	B	6
		66.33.50	12.17.13	B	6
Middle of thoſe in the head		20.13.43	19.29.38	B	6
Laſt of 3 in the head of the north. fiſh		21.24.14	20.57. 8	B	6
Preced. of 2 againſt the eye of the north. fiſh.		23 44. 2	23. 3 47	B	5
65. Middle of the bright ſtars in the ſouth line		14. 2.32	1. 4. 7	B	4
		17.13.57	7.23.22	B	6
		13.36.30	1.10.40	A	6
Preced. of 2 in the fin of the back		19.56.21	13.21. 8	B	5
		16.33.42	5.31.13	B	6
70. Subſ. againſt the eye of the north. fiſh		24.36.51	23. 6.23	B	5
		13.32. 9	1.55.32	A	6
		24.54.39	22.47.51	B	6
Middle in the fin of the back		20. 8:46	12.28.46	B	6
		12.56.58	4 49. 8	A	7
75. Upper in the fold of ſouth. line		14.27.33	1.30.24	A	5
Laſt of 3 in the fin of the tail		20. 8. 8	11.18. 9	B	6
North. of 2 againſt the mouth of the north. fiſh		25.17.53	21.59. 6	B	6
South. of the ſame		24.48.47	20.42.19	B	5
		13.42.48	4.40.45	A	7
80. That follow the fin of the back		21. 2. 4	12.25.29	B	5
		14.11.37	4.50.30	A	7
South. of 2 in the belly		22.58.52	15.29. 2	B	5
Laſt of 3 bright ones in the ſouth. line		16.22.34	13 25	A	4
		19.43.36	7.39.27	B	7
85.		16.23.14	51.50	A	6 7
South. of 2 in the fold of the ſouth. line		15.50.25	4.17.13	A	6
North. in the belly		25.17.31	17.26.56	B	5
Another following it		26.15.42	18.39.53	B	6
		22.30.17	8.20.43	B	7
90. Preced. of the contig. in the bending of the line		23.35.33	9.22. 3	B	5
Subſ. of the ſame		23.42.48	9.23.58	B	5
		18.46.21	3.34.52	A	7
		19.47. 6	1.57.39	A	6 7
		24. 4.44	8.17.49	B	6 7
95. Third of thoſe in north. line before the knot		19.37. 1	3. 4.25	A	5
North. of 3 in north. line		23.20.41	5.21. 7	B	4 3
		24. 1.56	4.20.47	B	6
Middle of thoſe in the north line		23.25.39	1.52. 5	B	5 4
		25.32	5.51.46	B	8
100.		24.40.27	3.40.32	B	7
		25.33.16	5.38. 7	B	6 7

Names and Situations of the Stars.	Signs.	Longitude. ° ′ ″	Latitude. ° ′ ″		Mag.
Second of thoſe in ſouth. line before the knot	♈	22. 58	4.43.12	A	5
		27.38. 3	9. 1.34	B	6 7
		28. 4.48	8.36.20	B	8
105.					
The next the knot in the north. line		24.15. 1	1.38.58	A	5
Firſt before the knot in the ſouth. line		24. 1.39	7.55.45	A	5
		25.32.26	8.35. 5	A	6 7
In the knot of the two lines	♈	26.52.56	9. 5.10	A	3

PISCIDIA, in botany, a genus of plants, producing papilionaceous flowers; the vexillum is emarginated and riſing upwards; the alæ are of the ſame length as the vexillum; and the carina is moon-ſhaped and aſcendant: the fruit is a membranaceous linear pod, having four longitudinal angles, and containing a few almoſt cylindrical ſeeds.

PISCINA, in antiquity, a large baſon in a public place or ſquare, where the Roman youth learned to ſwim, and which was ſurrounded with a high wall, to prevent caſting of filth into it.

PISCIS VOLANS, in aſtronomy, a ſmall conſtellation of the ſouthern hemiſphere, unknown to the ancients, and inviſible to us in theſe northern regions.

PISONIA, in botany, a genus, producing male and female flowers on different plants; the flower of the male is funnel-ſhaped, the tube ſhort, and the limb is cut into five acute ſegments, and ſpreads open; the filaments are five or ſix, and awl-ſhaped, terminated by obtuſe antheræ; the female flowers are of the ſame form, and the fruit is an oval quinquangular capſule, or berry, having but one cell, which contains a ſmooth oblong ſeed.

PISSASPHALTUM, earth pitch, in natural hiſtory, a fluid, opake, mineral body, of a thick conſiſtence, of a ſtrong ſmell, readily inflammable, but leaving a reſiduum of greyiſh aſhes after burning.

It ariſes out of the cracks of rocks, in ſeveral places in the iſland of Sumatra, and in ſome other parts of the Eaſt-Indies, and is much eſteemed there in paralytic diſorders. It is greatly recommended by the ancients as an emollient, maturant, and digeſtive; and was uſed in cataplaſms for ripening all ſorts of tumours, and againſt the ſciatica, and other pains of the limbs.

PISSELÆUM INDICUM, Barbadoes-tar, in natural hiſtory, a mineral fluid, of the nature of the thicker bitumens, and of all others the moſt approaching, in appearance, colour, and conſiſtence, to the true piſſaſphaltum, though differing from it in other reſpects.

It is very frequent in many parts of America, where it is found trickling down the ſides of mountains in large quantities, and ſometimes floating on the ſurface of the waters: but it ſeems to be almoſt loſt at this time in the iſland of Barbadoes, whence it was originally named.

It has been greatly recommended internally in coughs and other diſorders of the breaſt and lungs; but it is ſeldom to be met with genuine.

PISTACIA, in botany, a genus, producing male and female flowers on ſeparate trees; the male flowers are diſpoſed in a looſe ſcattered amentum, having ſmall uniflorous ſcales; there is no corolla, but the perianthium, which is ſmall and quinquifid, contains five ſmall filaments, topped with ovate, four-cornered, large, erect antheræ; the female flower has a ſmall trifid cup, with no corolla; the germen is ovate, larger than the cup, ſupporting three reflexed ſtyles, crowned with thick prickly ſtigmas: the fruit is a dry ovate drupe, containing a ſmooth nut of the ſame ſhape.

Piſtachia-nuts are brought from Perſia, Arabia, Syria, and the Eaſt-Indies; in theſe countries, the trees which produce them, grow to the height of twenty-five or thirty feet; the bark of the ſtem and old branches are of a dark ruſſet colour, but the young branches are of a light brown; theſe are furniſhed with pinnated leaves, compoſed ſometimes, and at others, three pair of folioles, terminated by an odd one; they approach toward an oval ſhape, and their edges turn backwards, which emit an odour like the nuts.

Theſe nuts abound with a ſweet and well-taſted oil, which they will yield in great abundance, on being preſſed after bruiſing them: they are reckoned wholeſome and nutritive, and are very proper to be preſcribed by way of reſtoratives, eaten in a moderate quantity, and to people emaciated with long illneſſes. They are recommended as peculiarly good to prevent obſtructions of the liver.

PISTIA, in botany, a genus of gynandrious plants, whoſe flower is monopetalous, lubuloſe, and unequal; the limb is ear-ſhaped, erect, and acuminated: the fruit is an ovate unilocular capſule, containing many oblong ſeeds, affixed to the back of the capſule.

PISTIL, *Piſtillum*, among botaniſts, denotes the female organ of generation in flowers, and is defined, by Linnæus, as an entrail of the plant, deſigned

ſigned for the reception of the farina, or male-duſt, wherewith it becomes impregnated; it conſiſts of three parts, viz. the germen, ſtyle, and ſtigma; the germen is the rudiment of the ſruit, accompanying the flower, and is of various ſhapes, but always ſituated below the ſtyle, or ſtigma, and contains the embryo-ſeeds; the ſtyle is the part that ſerves to elevate the ſtigma from the germen, and is alſo of different forms; the ſtygma, which is of various ſhapes likewiſe, is always placed on the top of the ſtyle, or, if that be wanting, on the top of the germen; this part is covered with a moiſture, for the breaking of the farina into more minute parts.

The piſtil, being the female part of a flower, is of great conſequence in the Linnæan Syſtem of Botany. See the article BOTANY.

PISTOL, the ſmalleſt piece of fire-arms, borne at the ſaddle-bow, on the girdle, and in the pocket.

PISTOLE, a gold coin ſtruck in Spain, and in ſeveral parts of Italy, Switzerland, &c.

The piſtole has its augmentations and diminutions, which are, quadruple-piſtoles, double-piſtoles, and half piſtoles.

PISTON, *Embolus*, in pump work, is a ſhort cylinder of metal, or other ſolid ſubſtance, fitted exactly to the cavity of the barrel or body of the pump.

PISUM, the pea, in botany. See the article PEA.

PITCH, a tenacious oily ſubſtance, drawn chiefly from pines and firs, and uſed in ſhipping, medicine, and various other arts: or it is more properly tar, inſpiſſated by boiling it over a ſlow fire.

PITH, in vegetation, the ſoft ſpungy ſubſtance contained in the central parts of plants and trees.

As the ſubſtance of the trunk in trees, ſays Boerhaave, become more woody, the pith is compreſſed and ſtraigthened to ſuch a degree, that it wholly diſappears. It is plain from this, that the office of the pith in vegetation, cannot be very great, ſince it is not of perpetual duration. By its ſpungy ſtructure, it ſeems fitted to receive any ſuperfluous moiſture, that might tranſude through the pores of the woody fibres. If by the exceſs of ſuch moiſture, or from any other cauſe, it happens to rot and periſh, as frequently happens in elms, the tree is found to grow full as well without it; a proof it is of no eſſential uſe in vegetation.

PITUITARY GLAND, in anatomy, a gland in the brain, of the ſize of a very large pea, placed under the cella of the os ſphenoides, under the infundibulum, wherewith it communicates, receiving from it a lymph or a juice, which the infundibulum derives from the plexus choroides and pineal gland; and from this lympha does the gland itſelf take its name. It alſo filtrates a juice itſelf, ſeparating from the blood a white liquor, very ſubtile, and apparently very ſpirituous.

PIVAT, or PIVOT, a foot or ſhoe of iron, or other metal, uſually conical, or terminating in a point, whereby a body, intended to turn round, bears on another fixed at reſt, and performs its circumvolutions. The pivot uſually bears or turns round in a ſole, or piece of iron or braſs, hollowed to receive it.

PLACARD, or PLACART, among foreigners, ſignifies a leaf or ſheet of paper, ſtretched out and applied on a wall or poſt, containing edicts, regulations, &c.

Among us, placard ſignifies a licence, whereby a perſon is permitted to uſe unlawful games, &c.

PLACARD, in architecture, denotes the decoration of the door of an apartment, conſiſting of a chambranle, crowned with its frieze or gorge, and a corniche, ſometimes ſupported by conſoles. See the article DOOR.

PLACE, *Locus*, in philoſophy, a mode of ſpace, or that part of immoveable ſpace which any body poſſeſſes. See the article SPACE.

Optical PLACE, the point to which the eye refers an object.

PLACE *of Radiation*, is the ſpace in a medium or tranſparent body, through which any viſible object radiates.

Excentric PLACE *of a Planet*. See the article EXCENTRIC.

Geocentric PLACE *of a Planet*. See the article GEOCENTRIC.

Heliocentric PLACE *of a Planet*. See the article HELIOCENTRIC.

PLACE, in geometry. See the article LOCUS.

PLACE, in war, a general name for all kinds of fortreſſes where a party may defend themſelves.

PLACE, in logic and oratory, denotes the ſeat or ſource of an argument, of which there are two kinds, inartificial and artificial; the firſt is the place of teſtimony, authority, &c. the ſecond, that of reaſon, as when we argue from univerſals, cauſes, &c.

Common PLACE. See the article COMMON PLACE.

PLACENTA, in anatomy, a ſoft roundiſh maſs, found in the womb of pregnant women; which, from its reſemblance to the liver, was called by the ancients, hepar uterinum, the uterine liver.

PLACENTA, is alſo a term uſed, by ſome botaniſts, for what is more uſually called the receptacle of the ſeeds. See the article RECEPTACLE.

PLAFOND, or PLAFOUND, in architecture, the ceiling of a room, whether it be flat or arched, lined with plaſter or joiner's work, and frequently enriched with painting.

The word plafond is alſo more particularly uſed for the bottom of the projecture of the larmier of the corniche, called alſo ſoffit. See the article SOFFIT.

PLAGIARY, in philology, the purloining another perſon's works, and putting them off for a man's own.

PLAGUE, Pestilence, or Pestilential-Fever, a moſt acute fever, ariſing from a poiſonous miaſma, brought from oriental countries, which, unleſs it is immediately expelled out of the body, by the ſtrength of the vital motions, by buboes and carbuncles, proves fatal.

In this, as well as in moſt contagious diſeaſes, ſays Hoffman, the venomous miaſma is ſwallowed with the air, and inſinuates itſelf into the ſalival juice; whence it aſſaults the head, brain, nerves, and animal ſpirits; producing a torpor in the head, a heavineſs, a ſleepineſs, a violent pain, a ſtupor of the ſenſes, a forgetfulneſs, inquietude, watching, and loſs of ſtrength. From the fauces it proceeds to the ſtomach, creating a loathing of food, nauſeas, anxiety of the precordia, a cardialgia attended with fainting, reaching to vomit, and vomiting itſelf. Hence it proceeds to the membranes of the ſpinal marrow, the coats of the arteries, producing horrors, a languid, ſmall, contracted, quick pulſe, and even fainting. All which are generally ſigns and ſymptoms of the plague, which are of a more violent and quick operation in proportion to the virulence of the peſtilential miaſma.

This diſeaſe differs from other contagious, malignant, and eruptive fevers, becauſe it is the moſt acute, and ſometimes kills on the firſt, and ſometimes on the ſecond day. In our climate, it is not epidemic or ſporadic, from a bad way of living or an unhealthy air, but happens when it is moſt ſalutary, from contagion alone, and is imported from hot countries where this diſeaſe rages. It will not only abate by intenſe cold, but be perfectly extinguiſhed: wherefore, in a cold ſeaſon and very cold countries, it either does not appear at all, or in a very mild degree; whereas if the climate is hot, it is not only moſt violent, but moſt common.

All plagues are not of the ſame nature, but vary according to different conſtitutions and circumſtances; but all who have written of the plague univerſally agree, that ſpongy and porous bodies, of an obeſe habit, of a ſanguine and phlegmatico-ſanguine conſtitutions, women, young perſons and children, perſons of a timid diſpoſition, that are poor, live hard, or are given to luxury, and ſit up late at night, are more apt to be afflicted with this diſeaſe than the ſtrong and intrepid, lean, nervous, endued with large veſſels, men, old perſons obnoxious to the hæmorrhoidal flux, and who have iſſues and open ulcers.

Nothing brings on this diſtemper ſooner than fear, a dread of death, and a conſternation of the mind. If the peſtilential poiſon is not expelled to the external parts, it is certainly fatal; nor is this to be done, according to Hoffman, as in other fevers, by large ſweats, by ſtools, by a flux of urine, by bleeding at the noſe, either natural or artificial: for theſe threaten deſtruction. The ſalutary and critical excretion which perfectly ſolves the peſtilential diſeaſe, is by tumours in the ſurface of the body, not otherwiſe than the eryſipelas, between the third and fourth day, and the ſooner the better, becauſe then the ſymptoms are mitigated. That there is poiſon contained in theſe tumours appears from hence, that if the ſurgeon opens any of the tumours with his lancet, and then bleeds a ſound man with the ſame, he will be immediately ſeized with the plague. The peſtilental tumours are of two kinds, the firſt ariſes in the glandulous places, moſt commonly in the groin and arm-pits; ſometimes in the parotid and mammary glands, as alſo the lower maxillary, and in thoſe near the aſpera arteria.

Plague-Water, *Aqua Epidemica*, one of the compound waters of the ſhops, diſtilled from mint, roſemary, angelica-roots, &c.

PLAIN, *Planus*, in general, an appellation given to whatever is ſmooth and even, or ſimple, obvious, and eaſy to be underſtood; and, conſequently, ſtands oppoſed to rough, enriched, or laboured.

A plain figure, in geometry, is an uniform ſurface; from every point of whoſe perimeter, right lines may be drawn to every other point in the ſame.

A plain angle is one contained under two lines, or ſurfaces, in contradiſtinction to a ſolid angle. See Angle.

The doctrine of plain triangles, as thoſe included under three right lines, is termed plain trigonometry. See the article Trigonometry.

Plain Chart. See the article Chart.

Plain Sailing. See Sailing.

Plain Scale. See Scale.

Plain Table, in ſurveying, a very ſimple inſtrument, whereby the draught of a field is taken on the ſpot, without any future protraction. It is generally of an oblong rectangular figure, and ſupported by a fulcrum, ſo as to turn every way by means of a ball and ſocket. It has a moveable frame, which ſerves to hold faſt a clean paper; and the ſides of this frame, facing the paper, are divided into equal parts every way. It has alſo a box with a magnetical needle, and a large index with two ſights: and, laſtly, on the edge of the frame, are marked degrees and minutes, to ſupply the place of a graphometer.

Plain Number, is a number that may be produced by the multiplication of two numbers into one another: thus 20 is a plain number, produced by multiplication of 5 into 4.

Plain Place, *Locus Planus*, or *Locus ad Planum*, among the antient geometricians, denoted a geometrical locus, when it was a right line or a circle, in oppoſition to a ſolid place, which was an ellipſis, parabola, or hyperbola. Theſe the moderns diſtinguiſhed into loci ad rectam, and loci ad circulum. See Locus.

Plain Problem, in mathematics, is ſuch a problem as cannot be ſolved geometrically, but by the interſection either of a right line and a circle, or of the circumferences of two circles; as, given the greateſt ſide, and the ſum of the other two ſides of a right-angled triangle, to find the triangle; as alſo to deſcribe a trapezium that ſhall make a given area of four given lines. Such problems can only have two ſolutions, in regard a right line can only cut a circle, or one circle cut another in two points.

PLAINT, in law, the exhibiting any action, real or perſonal, in writing. See the article ACTION.

PLAN, in general, denotes the repreſentation of ſomething drawn on a plane: ſuch as maps, charts, ichnographies, &c. See MAP, CHART, &c.

The term plan, however, is particularly uſed for a draught of a building, ſuch as it appears, or is intended to appear, on the ground; ſhewing the extent, diviſion, and diſtribution of its area, or ground-plot, into apartments, rooms, paſſages, &c.

A geometrical plan is that, wherein the ſolid and vacant parts are repreſented in their natural proportions.

The raiſed plan of a building, is the ſame with what is overwiſe called an elevation, or orthography. See ORTHOGRAPHY.

A perſpective plan, is that exhibited by degradations, or diminutions, according to the rules of perſpective. See the article PERSPECTIVE.

PLANCHIER, or PLANCERE, in architecture, the under part of the corona, or drip, making the ſuperior part of the corniche, between two cymatiums. See the articles CORNICHE and CYMATIUM.

PLANE, *Planum*, in geometry, denotes a plane ſurface, or one that lies evenly between its bounding lines: and as a right line is the ſhorteſt extenſion from one point to another, ſo a plane ſurface is the ſhorteſt extenſion from one line to another.

In aſtronomy, conics, &c. the term plane, is frequently uſed for an imaginary ſurface, ſuppoſed to cut and paſs through ſolid bodies; and on this foundation is the whole doctrine of conic ſections built.

PLANE, in joinery, an edged tool, or inſtrument for paring and ſhaving of wood ſmooth.

PLANE-TREE, *Platanus*, in botany, a genus of plants, producing male and female flowers. Botaniſts enumerate two ſpecies of theſe trees, one commonly called the oriental plane, and the other the occidental plane tree; the firſt ſort grows naturally in many parts of Aſia, where it riſes to a very great ſize; the ſtem is tall, erect, and covered with a ſmooth bark, which annually falls off; it ſends forth many ſide branches, which are generally a little crooked at their joints: the bark of the young branches is of a dark brown, inclining to a purple colour; theſe are furniſhed with leaves placed alternately, their footſtalks are an inch and a half long, the leaves are ſeven inches long and eight broad, deeply cut into five ſegments, and the two outer are ſlightly cut again into two more; theſe ſegments have many acute indentures on their edges, and have each a ſtrong midrib, with many lateral veins running to the ſides; the upper ſides of the leaves are of a deep green, and the under pale. The flowers come out upon long footſtalks, or ropes, hanging downward, each ſuſtaining five or ſix round balls of minute flowers; they come out at the ſame time as the leaves; and in warm ſummers the ſeeds ripen late in autumn, and if left on the trees will remain till ſpring, when the balls fall to pieces, and the briſtly down which ſurrounds the ſeeds helps to tranſport them to a great diſtance with the wind.

The occidental plane grows naturally in North-America; this tree alſo arrives to a great ſize; the footſtalks are longer and the leaves larger than the other ſort; they have ſeveral acute indentures on their borders, and are cut into three lobes or angles; the flowers grow in round balls, like the former, but are ſmaller. There are alſo two other ſorts, called the maple leaved plane, and the Spaniſh plane-tree, ſomewhat differing from the others in foliage. The oriental ſort was introduced into Italy in the early times of the Romans; their greateſt men took much pleaſure at their villas, which where ſurrounded with plane trees. Pliny affirms, that there was no tree whatſoever which ſo well defends from the heat of the ſun in ſummer, nor more kindly admits it in winter, than this plant, the branches being produced at a proportionable diſtance to the largeneſs of their leaves; ſo that when the leaves are fallen in winter, the branches very eaſily admit the rays of the ſun. And ſo much was this tree held in eſteem by the people of Aſia, that wherever they erected any grand buildings, the porticoes which opened to the air, terminated in groves of theſe trees. Plane trees are propagated from ſeeds, but principally by layers in this country, which will get rooted in a year, when they ſhould be planted in a nurſery for two or three years to get ſtrength, and then tranſplanted where they are intended to remain.

PLANET, *Planeta*, ϖλανήτης, a celeſtial body, revolving round the ſun as a center, and continually changing its poſition, with reſpect to the fixed ſtars; whence the name planet, which is a Greek word, ſignifying wanderer.

The planets are uſually diſtinguiſhed into primary, and ſecondary. The primary ones, called, by way of eminence, planets, are thoſe which revolve round the ſun as a center; and the ſecondary planets, more uſually called ſatellites, or moons, are thoſe which revolve round a primary planet as a center, and conſtantly attend it in its revolution round the ſun. See SATELLITE and MOON.

The primary planets, are again diſtinguiſhed into ſuperior and inferior. The ſuperior planets, are theſe further from the ſun than our earth; as Mars, Jupiter, and Saturn: and the inferior planets, are theſe nearer the ſun than our earth, as Venus and Mercury; for the aſtronomy, and other peculiarities, of which, ſee the articles MARS, JUPITER, &c.

Nature of the-PLANETS. That the planets are opake bodies, like our earth, appears evident for the following reaſons: 1. Since in Venus, Mercury, and Mars, only that part of the diſk illuminated by the ſun, is found to ſhine; and, again, Venus and Mercury, when between the earth and the ſun, appear like dark ſpots or maculæ, on the ſun's diſk; it is evident, that Mars, Venus, and Mercury, are opake bodies, illuminated with the borrowed light of the ſun. And the ſame appears of Jupiter, from its being void of light in that part to which the ſhadow of the ſatellites reaches, as well as in that part turned from the ſun; and that his ſatellites are opake, and reflect the ſun's light, is abundantly ſhewn. Wherefore, ſince Saturn, with his ring and ſatellites, only yield a faint light, fainter conſiderably than that of the fixed ſtars, though theſe be vaſtly more remote; and than that of the reſt of the planets; it is paſt all doubt, he too, with his attendants, are opake bodies. 2. Since the ſun's light is not tranſmitted through Mercury and Venus, when placed againſt him, it is plain they are denſe opake bodies; which is likewiſe evident of Jupiter, from his hiding the ſatellites in his ſhadow; and therefore, by analogy, the ſame may be concluded of Saturn. 3. From the variable ſpots in Venus, Mars, and Jupiter, it is evident theſe planets have a changeable atmoſphere; which changeable atmoſphere may, by a like argument, be inferred of the ſatellites of Jupiter, and therefore by ſimilitude the ſame may be concluded of the other planets. 4. In like manner, from the mountains obſerved in Venus, the ſame may be ſuppoſed in the other planets. 5. Since then, Saturn, Jupiter, both their ſatellites, Mars, Venus, and Mercury, are opake bodies, ſhining with the ſun's borrowed light, are furniſhed with mountains, and encompaſſed with a changeable atmoſphere; they have, of conſequence, waters, ſeas, &c. as well as dry land, and are bodies like the moon, and therefore like the earth. *Q. E. D.*

And hence, it ſeems highly probable, that the other planets have their animal inhabitants, as well as our earth.

PLANETARIUM, an aſtronomical machine, ſo called from its repreſenting the motions, orbits, &c. of the planets, agreeably to the Copernican ſyſtem.

The planetarium is more generally known by the name orrery, and therefore we have given its deſcription and uſe under that article. See ORRERY.

PLANETARY, ſomething relating to the planets.

PLANIMETRY, that part of geometry which conſiders lines and plane figures, without conſidering their hight or depth.

PLANISPHERE, ſignifies a projection of the ſphere, and its various circles on a plane; in which ſenſe maps, wherein are exhibited the meridians, and other circles of the ſpere, are planiſpheres.

PLANISPHERE, is more particularly uſed for an aſtronomical inſtrument uſed in obſerving the motions of the heavenly bodies.

PLANT, *Planta*, is defined to be an organical body, deſtitute of ſenſe and ſpontaneous motion, adhering to another body in ſuch a manner as to draw from it its nouriſhment, and having power of propagating itſelf by ſeeds. As to the parts of which a plant conſiſts, they are the root, ſtalk, branch, leaf, flower, and fruit; which ſee.

All botaniſts are of opinion that there is a certain analogy between plants and animals, ſince plants, like animals, are compoſed of certain parts, veſſels, &c. each kind of veſſel being ſuppoſed the vehicle of a different humour or juice, ſecreted from the matter of the ſap, which is conſidered as the blood or common fund of them all: two things are to be conſidered in plants, viz. the ſenſible and organic body, and the ſpirit or the vegetative body, which is the cauſe of the whole motion, and the principle of all vital functions. The ſpirit or active ſubſtance, which obtains the name of ſoul in living bodies, is not even entirely excluded from things deſtitute of life, ſince the ſubtile matter being carried by a perpetual motion, runs through the whole corporeal nature; but as it is too much diſperſed in bodies deprived of life, nor can find in them pipes and receptacles wherein it could be gathered in a greater quantity, thereby it could expel the humours it ſhould meet with, and not produce in them thoſe vital motions of nutrition and acretion; hence foſſils and other inanimated bodies are of a longer duration, becauſe not diſturbed or worn out by that vegetative and active ſubſtance: but in plants, as well as in animals, the active ſpirit continually agitated by the ſubtile matter, runs without intermiſſion throughout the whole body; and the more or leſs it is agitated, it wants a greater or leſs quantity of aliment, to avoid its feeding at laſt on the ſubſtance of the living body.

Plant and vegetable are nearly ſynonymous, every plant being a vegetable; which Boerhaave defines to be a body generated of the earth to which it adheres, and is connected with it by parts called roots, through which it receives the matter of its nouriſhment and increaſe, and conſiſts of juices and veſſels ſenſibly diſtinct from each other: or a plant is an organical body compoſed of veſſels and juices every where diſtinguiſhable from each other, to which the roots grow, or parts by which it adheres to ſome other body, and from which it derives the matter of its life and growth. This definition is very ſcientific, and furniſhes a juſt and adequate idea of a plant; for by its conſiſting of veſſels and juices, it is diſtinguiſhed from a foſſil; and by its adhering to another body, and deriving its nouriſhment therefrom, and being deſtitute of ſenſation, it is diſtinguiſhed from an animal; the mimoſa, or ſenſitive plant, approaching the neareſt to it. See FOSSIL, ANIMAL, and MIMOSA.

The veſſels, or containing parts of plants, conſiſt chiefly of earth bound or connected together by oil. In plants burnt by the intenſeſt fire, the earth or matter of the veſſels, is left intire and indiſſoluble by its utmoſt force; and conſequently the matter thereof is neither water, air, ſalt, or ſulphur, but earth alone.

The ſtudy of plants is both innocent and delightful; whoever applies himſelf to it will be ſoon agreeable ſurpriſed with the capacious field it opens for inquiry, where the human mind may range at large, and every day make freſh diſcoveries equally uſeful and entertaining. Now as every country hath its ſpontaneous plants, to raiſe and cultivate them in climates different from their own, requires much ſkill and art; for the plants of cold climates will not bear the heat of warm ones, any more than thoſe of the warm can ſupport the cold. Some of the Cape plants, in the heat of the torrid zone, grew at firſt amazingly, but ſoon after they loſt their leaves, and were with difficulty kept alive: in this there is a conſiderable latitude to be allowed, for plants may be raiſed in a climate not their own, provided the difference is not very great; for by degrees they become as it were naturalized to it (this is evident in moſt of our culinary plants, fruit-trees, wheat, &c. which originally came from foreign countries) for if they produce ſeeds, theſe ſeeds are much leſs apt to miſcarry, and produce hardier plants than ſuch as are brought immediately from their native country. Now if we attentively conſider the circumſtances in which particular plants are ſpontaneouſly produced, we ſhall directly diſcover a ſure and ſucceſsful method of cultivating them by art. Linnæus juſtly obſerves, in a curious paper upon this ſubject, in the firſt volume of the Swediſh acts, that the directions given in many books of gardening are founded merely on random practice; it being from wild plants alone that a rational method of culture can be deduced. He adds, that all plants grow ſomewhere wild, and that the buſineſs of art is to imitate their natural climate.

It was by following nature that the ingenious botaniſt abovementioned has been ſo ſucceſsful in bringing up the vaſt variety of plants that have fallen under his care. The rubus caule unifloro foliis ternatis was ſome time ago, he tells us, thought incapable of being raiſed about Stockholm, till attention to its natural climate taught him to keep it covered with ſnow during the winter and great part of the ſpring. The muſa, or plantain tree, the moſt ſpecious plant in nature, had ſtood near an hundred years in the Dutch botanical garden, and could not be made to blow; but on conſidering it was a native of Surinam, where the weather is dry for near half the year, and rainy the next, it was kept long without water, and afterwards kept watered abundantly, which cauſed it to flower and perfect its fruit; and by the ſame management, another muſa was made to flower the next year. For the botanical diſtribution of plants into claſſes, orders, genera, &c. ſee the articles BOTANY, GENUS, &c.

Paraſitical PLANTS. See PARASITES.

Senſitive PLANT. See MIMOSA.

Egg PLANT. See MELONGENA.

Foſſile PLANTS, thoſe found buried in the earth, and lodged in almoſt all the kinds of ſtrata, or ſubſtances, to be met with there.

PLANTA, in anatomy, the ſole of the foot. See the article FOOT.

PLANTAIN, *Plantago*, in botany, a genus of plants, whoſe flower is monopetalous, with a cylindrically globoſe tube, and a depreſſed limb cut into four ſegments; the ſtamina are four erect, long, capillary filaments, topped with oblong, compreſſed, incumbent antheræ. The fruit is an ovate, bilocular capſule, containing many oblong ſeeds. The common broad-leaved plantain, which flowers in May or June, is a great cooler, and ſtopper of fluxes of all kinds, particularly hæmorrhages, whether from the noſe, mouth, or uterus; it is likewiſe accounted a great healer of freſh wounds: the decoction is an excellent gargle in ulcers of the mouth; and, with lime-water, it cures ulcers in the legs: alſo made into an ointment, with freſh butter, it is ſaid to cure the piles. Ribwort and bucks-horn plantain are of this genus, and agree with the common plantain in virtues.

PLANTAIN-TREE, *Muſa*, in botany, a genus of plants, producing male and female flowers; the corolla of which is unequal and ringent; an erect, ligulated petal, cut into five indentures at the extremity, conſtitutes the upper lip, and a monophyllous, heart-ſhaped nectarium, the under one: the ſtamina are ſix ſubulated filaments, five of which are inſerted in the petal, and the ſixth in the nectarium, and double the length of the others; this is terminated with a linear antheræ, the others having none. The fruit is an oblong fleſhy berry, covered with a thick rind.

The plantain-tree is cultivated in the Weſt Indian iſlands; it riſes with a ſoft herbaceous ſtalk fifteen feet high, and upwards; the lower part is eight or nine inches diameter, diminiſhing gradually to the top, where the leaves come out on every ſide; theſe are often ſix feet long, and near two feet broad, having a ſtrong fleſhy mid-rib, and a great number of tranſverſe veins running from it toward the edges: theſe leaves come out from the center of the ſtalk, and are rolled up at their firſt appearance; but when they are advanced above the ſtalk, they expand quite flat and turn backwards: when the plant is grown to its full height, the flowers will appear in ſpikes in the center, which are often four feet in length; on the lower part of the ſpike they are largeſt, diminiſhing in their ſize upwards; each of theſe ſpikes is covered with a ſheath of a fine purple colour withinſide, which drops off when the flowers open: the upper part of the ſpike is covered with barren flowers, which fall off with their covers. The fruit is about eight or nine inches long, and above an inch diameter, having three blunt angles, and is a little incurved; it is at firſt green, but when ripe, of a pale-yellow colour; the ſkin is tough, and within is a ſoft pulp of a luſcious ſweet flavour: the ſpikes of fruit are often ſo large, as to weigh upward of forty pounds each.

This fruit in the Weſt-Indies is generally cut before it is ripe, and roaſted in the embers and eaten by the negroes as bread. The leaves are uſed for napkins and table-cloths, and are likewiſe food for hogs.

Of this genus, the banana is a ſpecies. See the article BANANA.

PLANTARIS, in anatomy, one of the extenſor muſcles of the foot, which has its origin from the interior part of the external condyle.

PLANTATION, in the Weſt-Indies, denotes a ſpot of ground, which a planter, or perſon arrived in a new colony, pitches on to cultivate for his own uſe, or is aſſigned for that purpoſe. However, the term plantation is often uſed in a ſynonymous ſenſe with colony.

PLANTING, in agriculture and gardening, is ſetting a tree or plant taken from its proper place, in a new hole or pit; throwing freſh earth over its root, and filling up the hole to the level of the ſurface of the ground.

The firſt thing in planting, is to prepare the ground, before the trees or plants are taken out of the earth, that they may remain out of the ground as ſhort a time as poſſible; and the next is to take up the trees, or plants, in order to their being tranſplanted.

In taking up the trees, carefully dig away the earth round the roots, ſo as to come at their ſeveral parts to cut them off; for if they are torn out of the ground without care, the roots will be broken and bruiſed to the great injury of the trees. When you have taken them up, the next thing is to prepare them for planting by pruning the roots and heads. And firſt, as to the roots, all the ſmall fibres are to be cut off, as near to the place from whence they are produced, as may be, except they are to be replanted immediately after they are taken up. Then prune off all the bruiſed or broken roots, all ſuch as are irregular, and croſs each other, and all downright roots, eſpecially in fruit-trees: ſhorten the larger roots in proportion to the age, the ſtrength, and nature of the tree; obſerving that the walnut, mulberry, and ſome other tender-rooted kinds ſhould not be pruned ſo cloſe as the more hardy ſorts of fruit and foreſt-trees: in young fruit-trees (ſuch as apples, pears, plumbs, peaches, &c.) that are one year old from the time of their budding or grafting, the roots may be left only about eight or nine inches long; but in older trees, they muſt be left of a much greater length: but this is only to be underſtood of the larger roots; for the ſmall ones muſt be chiefly cut quite out, or pruned very ſhort.

The next thing is the pruning of their heads, which muſt be differently performed in different trees; and the ſize of the trees muſt alſo be conſidered: thus, if they are deſigned for walls or eſpaliers, it is beſt to plant them with the greateſt part of their heads, which ſhould remain on till they begin to ſhoot in the ſpring, when they muſt be cut down to five or ſix eyes, at the ſame time taking care not to diſturb the roots. But if the trees are deſigned for ſtandards, you ſhould prune off all the ſmall branches cloſe to the place where they are produced, as alſo the irregular ones which croſs each other; and after having diſplaced theſe branches, you ſhould alſo cut off all ſuch parts of branches, as have by any accident been broken or wounded; but by no means cut off the main leading ſhoots which are neceſſary to attract the ſap from the root, and thereby promote the growth of the tree.

Having thus prepared the trees for planting, you muſt now proceed to place them in the earth; but firſt, if the trees have been long out of the ground, ſo that the fibres of the roots are dried, place them eight or ten hours in water, before they are planted, with their heads erect, and the roots only immerſed therein, which will ſwell the dried veſſels of the roots, and prepare them to imbibe nouriſhment from the earth. In planting them, great regard muſt be had to the nature of the ſoil; for if that be cold and moiſt, the trees ſhould be planted very ſhallow; and if it be a hard rock or gravel, it will be better to raiſe a hill of earth where each tree is to be planted, than to dig into the rock or gravel and fill it up with earth, as is too often practiſed, by which means the trees are planted as it were in a tub, and have but little room to extend their roots.

The next thing to be obſerved, is to place the trees in the hole in ſuch a manner that the roots may be about the ſame depth in the ground, as before they were taken up: then break the earth fine with a ſpade, and ſcatter it into the hole, ſo that it may fall in between every root, that there may be no hollowneſs in the earth: then, having filled up the hole, gently tread down the earth with your feet, but do not make it too hard, which is a great fault, eſpecially if the ground be ſtrong or wet.

Having thus planted the trees, they ſhould be faſtened to ſtakes driven into the ground, to prevent their being diſplaced by the wind, and ſome mulch laid upon the ſurface of the ground about their roots: as to ſuch as are planted againſt walls, their roots ſhould be placed about five or ſix inches from the wall, to which their heads ſhould be nailed, to prevent their being blown up by the wind.

The ſeaſons for planting are various, according to the different ſorts of trees, or the ſoil in which they are planted: for the trees whoſe leaves fall off in winter, the beſt time is the beginning of October, provided the ſoil be dry; but if it be a very wet ſoil, it is better to defer it till the latter end of February, or the beginning of March; and for many kinds of evergreens, the beginning of April is by far the beſt ſeaſon; though they may be ſafely removed at Midſummer, provided they are not to be carried very far; but you ſhould always make choice of a cloudy wet ſeaſon. *Miller's Gard. Dict.*

Reverſe PLANTING, a method of planting, in which the natural poſition of the plant, or ſhoot, is inverted; the branches being ſet into the earth, and the root reared into the air.

Dr. Agricola mentions this monſtrous method of planting, which he found to ſucceed very well, in moſt or all ſorts of fruit-trees, timber-trees, &c. Bradley affirms, that he has ſeen a lime-tree in Holland growing with its firſt roots in the air, which had ſhot out branches in great plenty, at the ſame time that its firſt branches produced roots and fed the tree.

Mr. Fairchild, of Hoxton, has practiſed the ſame with us, and gives the following directions for performing it: Make choice of a young tree of one ſhoot, of alder, elm, willow, or any other tree that eaſily takes root by laying; bend the ſhoot gently down into the earth, and ſo let it remain till it has taken root. Then dig about the firſt root, and raiſe it gently out of the ground, till the ſtem be nearly upright, and then ſtake it up. Then prune the roots, now erected in the air, from the bruiſes and wounds they received in being dug up, and anoint the pruned parts with a compoſition of two ounces of turpentine, four ounces of tallow, and four ounces of bees-wax, melted together, and applied pretty warm. Afterwards prune off all the buds or ſhoots that are upon the ſtem, and dreſs the wounds with the ſame compoſition, to prevent any collateral ſhootings, that might ſpoil the beauty of the ſtem.

PLANTING, in architecture, the laying the firſt courſe of ſtones, in the foundations of buildings. See the article FOUNDATION.

PLASTER, *Emplaſtrum*, in pharmacy, is defined to be an external application, of a harder conſiſtence than our ointments: theſe are to be ſpread according to the different circumſtances of the place, wound, or patient, either upon linen or leather.

If the part upon which they are to be laid be naturally hairy, it muſt be ſhaved; but that they may ſtick the better, the natural ſhape of the part muſt be conſulted, and the plaſter ſpread and formed accordingly, either round, ſquare, triangular, elliptical, in a lunar form, or in the ſhape of the letter T. Some alſo are divided at both ends, and others are perforated in the middle; theſe laſt are of frequent uſe in fractures attended with a wound; for by this contrivance, the wound may be cleanſed and dreſſed without removing the plaſter.

Theſe plaſters are of different forms, according to the part they are laid on; but they are uſually ſquare, or round: and, indeed, there is almoſt no part of the body which a plaſter, of one of thoſe forms, may not be made to ſerve for, if it be notched about the edges with a pair of ſciſſars.

The uſes of plaſters are various; they are ſerviceable in ſecuring the dreſſings, they alſo forward the maturation of the pus, agglutinate and heal wounds, unite broken bones, heal burns, aſſuage pain, and ſtrengthen weak parts.

The common plaſter is made by boiling one gallon of oil-olive, with five pounds of litharge finely powdered, in about a quart of water, over a gentle fire, and continually ſtirring them, till the oil and litharge are united, and the whole acquires the conſiſtence of a plaſter.

The quickſilver-plaſter is made thus: Take of the common-plaſter one pound, of quickſilver three ounces, and of the ſimple balſam of ſulphur a dram, and, laſtly, let them be incorporated.

A cephalic is ordered by the college to be made of two pounds of Burgundy pitch, one pound of ſoft labdanum, and yellow roſin and yellow wax, of each four ounces; one ounce of what is called the expreſſed oil of mace: the pitch, roſin, and wax, being firſt melted together, add firſt the labdanum, and then the oil of mace.

A ſtrengthening plaſter is made, by adding to two pounds of the common plaſter melted, half a pound of frankincenſe, and three ounces of dragon's-blood, both reduced to powder.

A drawing plaſter is made thus: Take yellow roſin and yellow wax, of each three pounds; of tried mutton-ſuet one pound; melt all together, and ſtrain the mixture for uſe.

The bliſtering plaſter is made thus: Take of the drawing plaſter two pounds, of cantharides one pound, of vinegar half a pint; the plaſter being melted, a little before it hardens, ſprinkle in the cantharides, reduced to a very fine powder; then add the vinegar, and beat all well together.

There are ſeveral other forms of plaſters, for which we muſt refer the reader to the diſpenſatories.

PLASTER, among builders, &c. The plaſter of Paris is a preparation of ſeveral ſpecies of gypſums, dug near Mont Maitre, a village in the neighbourhood of Paris; whence the name. See the article GYPSUM.

The beſt ſort is hard, white, ſhining, and marbly;

bly; known by the names of plaſter-ſtone, or parget of Mont Maitre. It will neither give fire with ſteel, nor ferment with aqua-fortis, but very freely and readily calcines in the fire into a very fine plaſter; the uſe of which in building, and caſting ſtatues, is well known. See the article Stucco.

As the modern taſte runs greatly into plaſtering, it were to be wiſhed that this art could be brought into its ancient perfection. The plaſters of the Romans were exceeding durable; witneſs ſeveral yards of it ſtill to be found on the top of the pont de Garde, near Niſmes. At Venice they uſe a very durable plaſter; but, as the ſecret of preparing it is not known among us, it would be worth while to try whether ſuch a ſubſtance might not be made, by boiling the powder of gypſum dry over the fire, for it will boil in the manner of water; and when this boiling or recalcining was over, the mixing with it roſin, or pitch, or both together, with common ſulphur, and the powder of ſea-ſhells. If theſe were all mixed together, and the water added to it hot, and the matter all kept hot upon the fire till the inſtant of its being uſed, ſo that it might be laid on hot, it is poſſible this ſecret might be hit upon.

Wax and oil of turpentine might alſo be tried as additions: theſe being the common ingredients in ſuch cements as we have accounts of are the firmeſt. Strong ale wort is by ſome directed to be uſed, inſtead of water, to make mortar of lime-ſtone be of a more than ordinary ſtrength. It is poſſible, that the uſe of this tenacious liquor, in the powdered ingredients of this propoſed plaſter, might greatly add to their ſolidity and firmneſs.

PLASTIC, πλαςικος, denotes a thing endued with a formative power, or a faculty of forming or faſhioning a maſs of matter, after the likeneſs of a living being; ſuch a virtue as ſome of the ancient Epicureans, and perhaps the Peripatetics too, imagined to reſide in the earth, or, at leaſt, to have anciently reſided therein; by means whereof, and without any extraordinary intervention of a creator, it put forth plants, &c.

Some of them ſeem to be of opinion, that animals, and even man himſelf, was the effect of this plaſtic power.

PLASTICE, the plaſtic art, a branch of ſculpture, being the art of forming figures of men, birds, beaſts, fiſhes, &c. in plaſter, clay, ſtuc, or the like.

PLAT-Veins, in the manege, the veins wherein we bleed horſes, one in the lower part of each ſhoulder, and the other in the flat part of the thighs.

Plats *of a Ship*, flat ropes made of rope-yarn, and weaved one over the other; they ſerve to ſave the cable from galling in the hawſe, or to wind about the flukes of the anchors, to ſave the pennant of the fore-ſheet from galling againſt them.

PLATBAND *of a Door or Window*, is uſed for the lintel, where that is made ſquare, or not much arched; theſe platbands are uſually croſſed with bars of iron when they have a great bearing, but it is much better to eaſe them by arches of diſcharge built over them.

Platbands *of Flutings*, are the liſts or fillets between the flutings of columns.

PLATE, in commerce, ſignifies gold or ſilver wrought into veſſels, for domeſtic uſes.

Plate, in heraldry, is a round flat piece of ſilver, without any impreſſion; but, as it were, formed ready to receive it.

Plate, is alſo a term uſed by our ſportſmen, to expreſs the reward given to the beſt horſes at our races.

Plates, in gunnery. The priſe-plates are two plates of iron on the cheeks of a gun-carriage, from the cape-ſquare to the center, through which the priſe-bolts go, and on which the handſpike reſts when it poiſes up the breech of the piece.

Breaſt-plates are the two plates on the face of the carriage, one on each cheek. Train-plates are the two plates on the cheeks, at the train of the carriage. Dulidge-plates are the ſix plates on the wheel of a gun-carriage, where the fellows are joined together, and ſerve to ſtrengthen the dulidges.

PLATFORM, in the military art, an elevation of earth, on which cannon is placed, to fire on the enemy; ſuch are the mounts in the middle of curtins: on the rampart there is always a platform, where the cannon are mounted.

It is made by the heaping up of earth on the rampart, or by an arrangement of madriers, riſing inſenſibly, for the cannon to roll on, either in a caſemate, or on attack in the outworks.

Platform, in architecture, is a row of beams, which ſupport the timber-work of a roof, and lie on the top of the wall, where the entablature ought to be raiſed.

This term is likewiſe uſed for a kind of terrace, or broad, ſmooth, open walk, at the top of a building, from whence a fair proſpect may be taken of the adjacent country. Hence an edifice is ſaid to be covered with a platform, when it is flat at top, and has no ridge. Moſt of the oriental buildings are thus covered, as were all thoſe of the ancients.

Platform, or Orlap, in a man of war, a place on the lower deck, abaft the main-maſt, between it and the cockpit, and round about the main capſtan, where proviſion is made for the wounded men in time of action.

PLATONIC, ſomething that relates to Plato, his ſchool-philoſophy, opinions, or the like; thus, Platonic love, denotes a pure ſpiritual affection, for which Plato was a great advocate, ſubſiſting between the different ſexes, abſtracted from all carnal appetites, and regarding no other objects but the mind and its beauties: or it is even a ſincere diſintereſted friendſhip, ſubſiſting between perſons of the ſame ſex, abſtracted from any ſelfiſh views, and regarding no other object than the perſon, if any ſuch love or friendſhip has aught of a foundation in nature.

Platonic Year, or the great year, is a period of time determined by the revolution of the equinoxes, or the ſpace wherein the ſtars and conſtellations return to their former places in reſpect of the equinoxes.

The Platonic year, according to Tycho Brahe, is 25816 years; according to Ricciolus, 25920; and according to Caſſini, 24800. See the article Precession *of the Equinoxes*.

This period once accompliſhed, it was an opinion among the ancients, that the world was to begin anew, and the ſame ſeries of things to turn over again.

PLATONISM, the doctrine and ſentiments of Plato and his followers, with regard to philoſophy, &c. See the article Academic.

PLATTOON, or Plottoon, in the military art, a ſmall ſquare body of forty or fifty men, drawn out of a battalion of foot, and placed between the ſquadrons of horſe, to ſuſtain them; or in ambuſcades, ſtreights, and defiles, where there is not room for whole battalions or regiments.

Plattoons are alſo uſed when they form the hollow ſquare, to ſtrengthen the angles. The grenadiers are generally poſted in platoons.

PLEA, in law, is what either party alledges for himſelf in court, in a cauſe there depending; and, in a more reſtrained ſenſe, it is the defendant's anſwer to the plaintiff's declaration.

Pleas are uſually divided into thoſe of crown and common pleas. Pleas of the crown are all ſuits in the king's name, or in the name of the attorney-general on his behalf, for offences committed againſt his crown and dignity, and againſt his peace; as treaſon, murder, felony, &c. Common-pleas are ſuch ſuits as are carried on between common perſons, in civil caſes. Theſe pleas may be divided into as many branches as there are actions.

To an action there is either a general or a ſpecial plea: and here, a general plea is a general anſwer to the declaration, as in a debt or contract; the general plea is, that he owes nothing; in a debt upon bond, that it is not his deed, or he paid it on the day; in an action on a promiſe, that he made no promiſe; and in a treſpaſs, not guilty. Special pleas are either in bar to the action brought, or in abatement of the writ on which the action is framed. All pleas are to be ſuccinct, without any unneceſſary repetitions, and muſt be direct and pertinent to the caſe.

PLEADING, in law, a ſpeech uttered at the bar in defence of a cauſe: but, in a ſtricter ſenſe, pleadings are all the allegations of the parties to a ſuit, made after the declaration, till the iſſue is joined.

In this ſenſe, they expreſs what is contained in the bar, replication, and rejoinder; and not what is in the declaration itſelf. Hence, defaults in the matter of declaration are not confined within the miſpleading.

PLEBEIAN, *Plebeius*, any perſon of the rank of the common people.

It is chiefly uſed in ſpeaking of the ancient Romans, who were divided into ſenators, knights, and plebeians or commons.

PLEDGE, *Plegius*, in common law, a ſurety, either real or perſonal, which the plaintiff is to find, for proſecuting the ſuit.

PLEDGERY, or Pleggery, ſuretiſhip, or an anſwering for another perſon.

PLEDGET, Bolster, or Compress, *Plumaceolus*, in ſurgery, a kind of flat tent, laid over a wound, to imbibe the ſuperfluous humours, and keep it clean. See the article Wound.

PLEIADES, *Vergiliæ*, in aſtronomy, an aſſemblage of ſtars in the neck of the conſtellation Taurus. See Taurus.

PLENARTY, in law, is when a church benefice is full of an incumbent.

PLENARY, ſomething complete or full.

PLENILUNIUM, in aſtronomy, that phaſis of the moon commonly called the full moon. See the article Moon.

PLENIPOTENTIARY, a perſon veſted with full power to do any thing. See the article Embassador.

PLENITUDE, *Plenitudo*, the quality of a thing that is full, or that fills another.

In medicine, it chiefly denotes a redundancy of blood and humours. See the article Plethora.

PLENUM, in phyſics, denotes, according to the Carteſians, that ſtate of things, wherein every part of ſpace is ſuppoſed to be full of matter; in oppoſition to a vacuum. See Vacuum.

PLEONASM, *Pleonaſmus Redundantia*, a figure in rhetoric, whereby we uſe words ſeemingly ſuperfluous, in order to expreſs a thought with the greater energy: ſuch as, I ſaw it with my own eyes, &c.

This grammarians uſually reckon a fault in diſcourſe.

PLEROTICS, *Plerotica*, in medicine, a kind of remedies that are healing, or that fill up the fleſh: otherwiſe called incarnatives and ſarcotics. See the article Sarcotics.

PLETHORA, in medicine, a greater redundance of laudable blood and humours than is capable of undergoing thoſe changes which muſt neceſſarily happen for the purpoſes of life, without inducing diſeaſes.

A plethora is cured by veneſection, exerciſe, watchings, a ſharp and acrid diet, after due evacuation, cuations, and by a gradual omiſſion of theſe evacuations.

PLETHORIC, *Plethoricus*, a perſon abounding with blood, or labouring under a plethora.

PLEVIN, *Plevina*, in law, the ſame with pledge. See PLEDGE.

PLEURA, in anatomy, a ſmooth, robuſt, and tenſe membrane, adhering to the ribs and to the intercoſtal muſcles, and ſurrounding the whole cavity of the thorax. Its ſtructure reſembles two ſacks, one of which ſurrounds one ſide of the thorax, and the other the other ſide, and each of them contains one of the two lobes of the lungs: from the conjunction of theſe two ſacculi of the pleura, in the middle of the thorax, is formed the mediaſtinum.

PLEURISY, πλευρῖτις, in medicine, a violent pain in the ſide, attended with an acute fever, a cough, and a difficulty of breathing.

This diſorder effects all the parts of the internal integuments of the thorax, the whole of the pleura, and the whole of the mediaſtinum; and therefore, when it is ſeated in the membrane internally lining the ribs, it is called a true or internal pleuriſy; but when it chiefly occupies the external parts, and only the intercoſtal muſcles, and thoſe above them, are affected, it is called a ſpurious or baſtard pleuriſy.

The pleuriſy is moſt predominent between the ſpring and ſummer. It begins with chilneſs and ſhivering, which are ſoon ſucceeded by heat, thirſt, inquietude, and the other common ſymptoms. After a few hours, the patient is ſeized with a violent pricking pain in one of his ſides, about the ribs, which ſometimes extends itſelf towards the ſhoulder-blades, ſometimes towards the back-bone, and ſometimes towards the fore-parts of the breaſt, and this is attended with frequent coughing. The matter which the patient ſpits, is at firſt little and thin, and mixed with particles of blood; but as the diſeaſe advances, it is more plentiful and more concocted, but not without a mixture of blood. The pulſe is remarkably ſtrong, and ſeems to vibrate like a tenſe ſtring of a muſical inſtrument; and the blood drawn from a vein, as ſoon as it is cold, looks like melted ſuet. As to the ſpitting, it is frequently abſent, and hence pleuriſies are diſtinguiſhed into moiſt and dry.

As in all inflammatory fevers, ſo in this, too hot a regimen is to be ſhunned, both with reſpect to the bed-cloaths and the heat of the room; nor muſt the patient be expoſed to the cold air, nor drink things actually cold. Hoffman obſerves, that all ſtrong ſudorifics and cathartics are hurtful; and that if the patient has three or four ſtools, the courſe of nature muſt not be ſtopped. The diet ſhould be cooling, relaxing, ſlender, and diluting. Moiſtening things taken warm, are preferable to all others; and hence barley or oatmeal-gruel, ſweetened with honey, and alſo ſweet whey, are proper. If the phyſician is called before the third day, Boerhaave directs a large quantity of blood to be let, from a wide orifice in a large veſſel, and to fetch deep ſighs, or cough, to promote its celerity; and the part affected ſhould be rubbed gently at the ſame time, and the bleeding continued till the pain remits, or the patient is ready to faint. This ſhould be repeated as often as the ſymptoms return, which it was intended to remove, and till the abſence of the white inflammatory pellicle from the ſurface of the blood when cold, ſhews it is time to leave it off. This Huxham confirms by his own experience, and adds, that after the fourth day, bleeding is not ſafe; he alſo recommends fomenting the part, which often eaſes the pain, and terminates the diſeaſe; but if it is obſtinate, he recommends ſlight ſcarifications, then cupping, and afterwards a bliſter on the ſame place; which has been ſucceſsful, when the uſual methods failed. The patient's body ſhould be kept open, for which purpoſe emollient clyſters are proper; and he ſhould, at the ſame time, take large quantities of ſtrong, diluting, aperient, and antiſeptic liquors; for this purpoſe, take the leaves of jack-by-the-hedge, and white horehound, each two ounces; boil them in two pints of water, with which mix of the oxymel of ſquills eight ounces; of nitre, three drams; and of treacle-vinegar, one ounce; of this mixture let the patient, every quarter of an hour, take two ounces, as warm as poſſible.

Dr. Mead obſerves, on the treatment of this diſorder, that after drawing as much blood as is neceſſary, draughts with freſh-drawn linſeed-oil, are of great ſervice for eaſing the cough; nitre, for allaying the heat; and for diſſolving the ſizy blood that obſtructs the ſmall canals, wild goat's blood and volatile ſalts; and, laſtly, a bliſter laid on the patt affected, in order to draw fourth the peccant humour.

A purulent abſceſs or empyema is ſometimes formed in this diſeaſe, for the treatment of which, ſee EMPYEMA.

As to the baſtard-pleuriſy, Hoffman ſays that it is properly a kind of rheumatiſm, and does not require bleeding, unleſs the patient is plethoric, but a diaphoreſis and a more free perſpiration. Lanciſi, however, adviſes plentiful bleeding in the arm, ſcarifying the part affected, and cupping: and during the cure, it is neceſſary to keep the body open, and the bowels free from ſpaſms; for which purpoſe emollient clyſters are proper, with oil of ſweet-almonds.

PLEUROPNEUMONY, in medicine, a diſeaſe partaking of the nature both of a pleuriſy and peripneumony. See the articles PLEURISY and PERIPNEUMONY.

PLEXUS, among anatomiſts, a bundle of ſmall veſſels interwoven in the form of net-work; thus a congeries of veſſels within the brain is called plexus choroides, reticularis, or retiformis. See the article *Plexus* CHOROIDES.

A plexus of nerves is an union of two or more nerves, forming a ſort of ganglion or knot.

PLICA POLONICA, in medicine, a diſeaſe of the hair, almoſt peculiar to Poland and Lithuania, and hence denominated polonica. It conſiſts of a preternatural bulk of hair, which being firmly conglutinated and wrapped up in inextricable knots, and extended to a monſtrous length, affords a very unſeemly ſpectacle. When theſe are cut off, the blood is diſcharged from them, the head racked with pain, the ſight impaired, and the patient's life frequently endangered.

PLICATED, ſomething folded together, one part over another; as the leaves of certain plants, &c.

PLINIA, in botany, a genus of plants, the flower of which conſiſts of a plane petal divided into five ovate concave ſegments; the filaments are numerous, hairy, and topped with ſmall antheræ. The fruit is a large, globoſe, unilocular berry, containing one large, globoſe, ſmooth ſeed.

PLINTH, ORLE, or ORLO, in architecture, a flat ſquare member, in the form of a brick.

It is uſed as the foundation of columns, being that flat ſquare table, under the mouldings of the baſe and pedeſtal at the bottom of the whole order. It ſeems to have been originally intended to keep the bottom of the original wooden pillars from rotting.

Vitruvius alſo calls the Tuſcan abacus, plinth.

PLINTH *of a Statue*, &c. is a baſe, either flat, round, or ſquare, that ſerves to ſupport it.

PLINTH *of a Wall*, denotes two or three rows of bricks advancing out from a wall; or, in general, any flat high moulding, that ſerves in a front wall to mark the floors, to ſuſtain the eaves of a wall, or the larmier of a chimney.

PLOT, in dramatic poetry, is ſometimes uſed for the fable of a tragedy or comedy, but more particularly the knot or intrigue, which makes the embarras of any piece. The unravelling puts an end to the plot.

PLOT, in ſurveying, the plan or draught of any field, farm, or manor, ſurveyed with an inſtrument, and laid down in the proper figures and dimenſions.

PLOTTING, among ſurveyors, is the art of laying down on paper, &c. the ſeveral angles and lines of a tract of ground ſurveyed by a theodolite, &c. and a chain.

In ſurveying with the plain-table, the plotting is ſaved; the ſeveral angles and diſtances being laid down on the ſpot, as faſt as they are taken. See the article PLAIN-TABLE.

But, in working with the theodolite, ſemicircle, or circumferentor, the angles are taken in degrees; and the diſtances in chains and links; ſo that there remains an after-operation to reduce theſe members into lines, and ſo to form a draught, plan, or map; this operation is called plotting.

Plotting then is performed by means of two inſtruments, the protractor, and plotting-ſcale. By the firſt, the ſeveral angles obſerved in a field with a theodolite, or the like, and entered down in degrees in the field-book, are protracted on paper in their juſt quantity.

By the latter, the ſeveral diſtances meaſured with the chain, and entered down in like manner in the field-book, are laid down in their juſt proportion.

Under the articles protractor and plotting-ſcale, are found ſeverally the uſe of their reſpective inſtruments in the laying down of angles and diſtances: in which alſo are given their uſe conjointly in the plotting of a field, ſurveyed either with the circumferentor or theodolite.

PLOUGH, in agriculture, a machine for turning up the ſoil, contrived to ſave the time, labour, and expence that without this inſtrument muſt have been employed in digging land, to prepare it for the ſowing of all kinds of grain.

PLOUGHMAN's-SPIKENARD. See the articles BACCHARIS and CONYZA.

PLOUGHING, or PLOWING, in agriculture, turning up the earth with a plough. Ploughing is principally either that of lays or fallows. Ploughing of lays, is the firſt cutting up of graſs-ground for corn, and is a work commonly performed in January. The beſt time for doing it is when the land is wet, becauſe the turf is then ſoft and tough, and will turn up without breaking. In the well turning of this conſiſts the chief part of this ſort of ploughing, which if rightly performed, will lay the turf ſo flat and true, that it can hardly be ſeen where the plough went. This, indeed, depends greatly upon the make of the plough; but if the earth-board does not turn the turf well, ſome nail upon it a ſmall piece of wood, to take the upper part of the earth as it riſes upon the earth-board, which cauſes it to fall with the graſs ſide downwards. Ploughing of fallows, called alſo fallowing, is preparing land by ploughing long before it is ploughed for ſeed. See the article FALLOWING.

PLUKENETIA, in botany, a genus of plants producing male and female flowers, the corolla of each conſiſts of four ovate patent petals; the male flower hath eight very ſhort filaments, joining at their baſe, and topped with erect antheræ: the female flower hath a quadrangular germen, which becomes a depreſſed capſule, with keel-ſhaped angles, containing four cells, incloſing in each a roundiſh compreſſed ſeed.

PLUM-TREE, *Prunus*, in botany, a genus, whoſe flower conſiſts of five roundiſh concave petals, inſerted in the cup, with upwards of twenty ſtamina: the fruit is either a roundiſh or oval drupe, with a longitudinal furrow, containing a compreſſed and acute pointed nut, with the ſutures ſtanding out each way in an edge.

The plum tree, it is ſaid, is a native of Armenia, and the country about Damaſcus, from whence they were firſt brought to Italy, and from thence to the other European countries.

As there are a conſiderable number of ſorts of plums, we ſhall only mention a few of the beſt. 1. The perdigron plum. 2. The violet perdigron. 3. The white perdigron. 4. The myrobalan. 5. The green gage. 6. The drap d'or. 7. St. Catherine. 8. Mirabelle. 9. The damaſk violet. 10. The Orleans; this is the moſt common. 11. The imperial. 12. The mogul; theſe two laſt are good for baking, or ſweet-meats: to which may be added, ſeveral other ſorts, together with the damaſon, ſloe, black and white bullace, which grow in the hedges, and are fit for tarts, the damaſon in particular. They are propagated by inoculation, on wild plum ſtocks, and may be trained either for dwarf, eſpalier, wall, or ſtandard trees. Plum trees do not only produce their fruit upon the laſt year's wood, but alſo upon curſons or ſpurs, which come out of wood that is many years old; therefore on thoſe againſt walls, or eſpaliers, there is no neceſſity for ſhortening the branches, in order to obtain new ſhoots annually in every part of the tree (as is practiſed with peaches and nectarines) ſince the more theſe trees are pruned, the more luxuriant they grow, until the ſtrength of them is exhauſted, and then they gum and ſpoil; therefore the beſt method to manage theſe trees, is to lay in their ſhoots horizontally as they are produced, at equal diſtances, in proportion to the length of their leaves, and during the growing ſeaſon all foreright ſhoots ſhould be diſplaced, and ſuch as are to remain, ſhould be gradually trained to the wall or eſpalier, which will not only render them beautiful, but alſo give to each an equal advantage of ſun and air, and hereby the fruit will be always kept in a ductile growing ſtate, which they ſeldom are when overſhadowed with ſhoots ſome part of the ſeaſon, and then ſuddenly expoſed to the air and ſun. Plum trees require a ſoil neither too moiſt or too dry, and thoſe which are planted againſt walls, ſhould have a ſouth-eaſt, ſouth-weſt, or weſt aſpect, which is more kindly for them than the ſouth expoſure; and ſome of the hardier ſorts may be planted againſt a north aſpected wall: plums gathered a day before they are eaten, and kept in nettles, are rather finer flavoured than freſh from the tree, when gathered in the middle of the day; they are in general moiſtening, laxative, and emollient (except the bullace and ſloes, which are aſtringent) they are alſo cooling, quench thirſt, and create an appetite, and therefore they agree beſt with hot conſtitutions, but they do not at all agree with thoſe that have weak ſtomachs. In thoſe years that plums are very plenty, and conſequently much eaten by all ſorts of people, fluxes of the belly generally abound, which often turn to bloody-fluxes, hence it appears that they always ſhould be eaten with moderation, and ſhould be quite ripe and ſound.

Braſilian-PLUM. See the article SPONDIAS.

Hog-PLUM. See SPONDIAS.

PLUMAGE, the feathers which ſerve birds for a covering.

Plumage, is, in falconry, particularly underſtood of the feathers under a hawk's wing. Falconers give their hawks ſmall feathers to make them caſt, and theſe alſo they call plumage.

PLUMB LINE, among artificers, denotes a perpendicular to the horizon; ſo called as being commonly erected by means of a plummet. See PLUMMET.

PLUMBAGO, leadwort, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped, the tube is cylindric and narrow at the top, and the limb is cut into five oval ſpreading ſegments: the ſtamina are five ſubulated filaments, topped with ſmall oblong verſatile antheræ: the ſeed is ovate and ſingle, and included in the cup.

PLUMBAGO, mock-lead, in mineralogy, a foſſile ſubſtance reſembling lead-ore, much uſed in drawing, and for making pencils.

PLUMBERY, the art of caſting and working lead, and uſing it in buildings, &c. See the article LEAD.

PLUMBUM, lead, in natural hiſtory. See the article LEAD.

PLUMERIA, in botany, a genus of plants, whoſe flower is monopetalous, and funnel-ſhaped, with a long tube, and divided into five oblong ovate ſegments; at the limb, in the center of the tube, are placed five ſubulated filaments, terminated with connivent antheræ. The fruit is compoſed of two long ventricoſe acuminated follicles, which are formed of one valve each, containing a number of oblong imbricated winged ſeeds. This genus, being natives of the Weſt Indies, they require a hothouſe in this climate for their preſervation. They abound with a milky cauſtic juice, which is reckoned poiſonous: in cutting off any of the branches of theſe plants, if the knife be not immediately cleaned, the juice will corrode it, and turn the blade almoſt black in a very little time, ſo as not to be cleaned off again, and if dropped upon linen, will cauſe it to waſh in holes equal to aqua-fortis.

PLUMMET, PLUMB-RULE, or PLUMB-LINE, an inſtrument uſed by carpenters, maſons, &c. in order to judge whether walls, &c. be upright planes, horizontal, or the like. It is thus called from a piece of lead, *plumbum*, faſtened to the end of a chord, which uſually conſtitutes this inſtrument. Sometimes the ſtring deſcends along a wooden ruler, &c. raiſed perpendicularly on another; in which caſe it becomes a level. See LEVEL.

PLUMMING, among miners, is the method of uſing a mine-dial, in order to know the exact place of the work where to ſink down an air-ſhaft, or to bring an adit to the work, or to know which way the load inclines when any flexure happens in it.

PLUMOSE, ſomething formed in the manner of feathers, with a ſtem and fibres iſſuing from it on each ſide: ſuch are the antennæ of certain moths, butterflies, &c.

PLUNGER, in mechanics, the ſame with the forcer of a pump. See the article FORCER.

PLURAL, *Pluralis*, in grammar, an epithet applied to that number of nouns and verbs which is uſed when we ſpeak of more than one thing; or that which expreſſes a plurality or number of things. See NUMBER.

PLURALITY, *pluralitas*, a diſcrete quantity, conſiſting of two or a greater number of the ſame kind: thus we ſay a plurality of gods, &c.

Hence plurality of benefices, or livings, is where the ſame clerk is poſſeſſed of two or more ſpiritual preferments, with cure of ſouls.

PLUS, in algebra, a character marked thus +, uſed for the ſign of addition. See the article CHARACTER.

PLUSH, in commerce, &c. a kind of ſtuff, leaving a ſort of velvet knap, or ſhag, on one ſide, compoſed regularly of a woof of a ſingle woollen thread and a double warp, the one wool, of two threads twiſted, the other goats or camels hair; though there are ſome pluſhes entirely of worſted, and others compoſed wholly of hair.

PNEUMATICS, called alſo pneumatology and pneumatoſophy, among ſchoolmen, the doctrine and contemplation of ſpirits and ſpiritual ſubſtances, as God, angels, and the human ſoul, in which ſenſe pneumatics are the ſame with what we otherwiſe call metaphyſics. See the article METAPHYSICS.

PNEUMATICS is more commonly uſed among us, for that part of natural philoſophy which treats of the nature and properties of the air.

PNEUMONICS, in pharmacy, medicines proper in diſeaſes of the lungs, in which reſpiration is affected. Of this number are ſulphur, lungwort, hyſſop, ground-ivy, and colt's-foot: they are uſed in phthiſes, aſthmas, peripneumonies, pluriſies, &c.

POA, meadow-graſs, in botany, a genus of plants, the corolla whereof is compoſed of two valves, of an ovato-acuminated figure; hollow, compreſſed, and ſomewhat longer than the cup, and without awns. It ſupplies the place of a pericarpium; and adheres every way to the ſeed, which is ſingle, of an oblong figure, compreſſed and pointed at each end.

This is the moſt common of all graſſes with us, and makes principally the green covering of moſt of our fields and meadows.

POCKET, in the woollen trade, a word uſed to denote a larger ſort of bag, in which wool is packed up to be ſent from one part of the kingdom to another. The pocket contains uſually twenty-five hundred weight of wool.

POCK-WOOD, *Guaicum*, in botany, ſee the article GUAICUM.

POD, *Siliqua*, among botaniſts, a kind of pericarpium, conſiſting of two valves, which open from the baſe to the point, and wherein the ſeeds are faſtened along both the ſurtures or joining of the valves, ſuch are the ſeed veſſels of the cabbage, turnep, radiſh, ſtock, &c.

PODAGRA, in medicine, the gout in the feet. See the article GOUT.

PODOMETER, or PEDOMETER, the ſame with perambulator. See the article PERAMBULATOR.

PODARIA, in zoology, a diviſion, order, or ſeries of wingleſs inſects, with ſhort bodies, and not very numerous legs; comprehending the puceron, pediculus, acarus, ſpider, ſquill, &c. See the article PUCERON.

PODOPHYLLUM, ducks-foot, in botany, a genus of plants, the flower of which conſiſts of nine orbiculated concave petals, plicated at their margin; the filaments are numerous, very ſhort, and topped with large oblong erect antheræ: the fruit is an ovate, unilocular berry, crowned with the ſtigma, and contains a number of roundiſh ſeeds.

POEM, Ποιημα, a compoſition in verſe of a due length and meaſure. See the articles VERSE and MEASURE.

Poems are generally denominated from the ſubject matter, as the apobaterion, epibaterion, epinicion, epithalamium, genethliac, elegiac, ſatiric, epitaph, panegyric, lyric, paſtoral, &c. and others, from the manner of narration, as epic, dramatic, &c. to which may be added odes, eclogues, and idylliums. To this head may alſo be referred ſeveral other compoſitions of a leſs ſerious kind, as the acroſtic, enigma, anagram, cento, echo, &c. See each under its proper head: APOBATERION, &c.

The Abbé Du Bos obſerves, in regard to poems, that ſome are intereſting in general, others in particular; that the beauties of execution alone do not conſtitute a good poem; that the defects of poems are leſs diſcernable than thoſe of a picture; that our diſlike falls only on the bad part of a poem; that every kind of poem has ſomething particular in its ſtyle; that by the beauty of the ſtyle we muſt judge of poems; that it muſt be a long time before the merit of a good poem is diſtinguiſhed; and finally, that the character of the poetic ſtyle has always decided the good or bad ſucceſs of poems, even of thoſe which by their length ſeem to have the greateſt dependance on the œconomy of the plan, on the diſtribution of the action, and on the decency of the manners.

POESY, the ſame with poetry. See the article Poetry.

POET, ποιητης, the author of a poem. See the article Poem.

POETS Rosemary. See the article Osyris.

POETICAL, ſomething that relates to poetry or poets, in which ſenſe we ſay poetical genius, poetical licence, &c.

Poetical Justice, is chiefly uſed in reſpect of the drama, to denote a diſtribution of rewards and puniſhments to the ſeveral perſons at the cataſtrophe or cloſe of a piece, anſwerable to the ſeveral characters they appeared in.

Poetical *riſing and ſetting of the Stars.* The three kinds of riſing and ſetting, viz. the coſmical, acronical, and helical, were made by the antient poets, referring the riſing, &c. of the ſtars to that of the ſun. See Cosmical, &c.

POETICS, the doctrine of poetry, or the laws and rules of conducting pieces, or compoſitions of poetry, ſuch is Ariſtotle's Poetics, a work much valued.

POETRY, the art of compoſing poems, or pieces in verſe; or, as defined by Voſſius, the art of repreſenting actions in metre.

Voſſius thinks that love was the firſt occaſion of poetry, which is not improbable, conſidering that this affection is coeval with mankind, is univerſal, and naturally productive of poetry; yet it undoubtedly owes its increaſes and progreſs to religion: Dacier indeed calls it the offspring of religion; and it is certain, in the earlieſt ages of the world, that it was uſual to ſing hymns to the honour of the gods upon ſolemn feſtivals. Du Bos thinks that poetry has been employed in all ages, even by the moſt unpoliſhed nations, to preſerve the memory of paſt events. Its principal aim is to flatter our ſenſes and imagination: for, according to Plato, it awakens the ſpiritual empire of the ſoul. Every kind of poetry charms us in proportion to its object, ſays Du Bos; and to be very affecting, it ought to be very exact. It is not the ſame with poetry as with other arts, for an ignorant perſon may judge of poetry by the impreſſion it makes on him: whence all men have a right to give their opinion of a piece of poetry, and this judgment ought to be founded on experience rather than on argumentation. Poetry is an art where every thing ſhould pleaſe. It is not enough to exhibit nature, which in certain places and circumſtances is rude and unpleaſant, but the poet muſt chuſe in her what is beautiful from what is not: whence a poet ought to chuſe, for the ſubject of his imitation, ſomething that is naturally affecting. There is a particular rhetoric for poetry, which conſiſts in diſcerning very preciſely what ought to be ſaid figuratively, and what ought to be ſpoken ſimply; and in knowing where ornament is required, and where not: yet the ſtyle ſhould be copious, and every ſpecies of writing in this art ſhould have a diction proper to itſelf.

The qualifications then neceſſary for poetry, or thoſe which form a good poet, are ſeldom found united in one perſon: he muſt have an extraordinary genius, great natural gifts, a wit juſt, piercing, ſolid, and univerſal; an underſtanding clear and diſtinct; an imagination neat and pleaſant; an elevation of ſoul that depends not on art, or ſtudy, and which is purely a gift of heaven, and muſt be ſuſtained by a lively ſenſe and vivacity; a great judgment to conſider wiſely of things, and a vivacity to expreſs them with that grace and abundance which gives them beauty. In fine, to accompliſh a poet, is required a temperature of wit and fancy, of ſtrength and ſweetneſs, of penetration and delicacy; but, above all, he muſt have a ſovereign eloquence, and a profound capacity. Theſe are the qualities that muſt concur together to form the genius of a poet, and ſuſtain his character.

The rules of poetry and verſifying are taught by art, and acquired by ſtudy; but this force and elevation of thought, which Horace calls ſomething divine, and which alone makes the poetry of any value, muſt be derived from nature; or, according to Ariſtotle, from ſome happy tranſports, to which that author gives the name of madneſs. Hence the critics conclude, the end of poetry is to pleaſe; its cauſe, either the excellence of the poet's genius, or a poetical fury and tranſport of the ſoul, manageable by the judgment; its matter, long and ſhort ſyllables, and feet compoſed hereof, with words furniſhed by grammar; and its form, the arrangement of all theſe things in juſt and agreeable verſe, expreſſing the thoughts and ſentiments of the author after the manner already mentioned. But after all, how narrow are all theſe bounds, if we conſider poetry in the light wherein the works of Homer and Virgil have ſet it. This, which is therefore diſtinguiſhed by the name of the greater poetry, in contradiſtinction to the low and ſimple, or verſification, conſiſts principally in fiction, or the invention of fables, in the expreſſing of things by allegories, and metaphors, and in the inventing of actions, under which the truths which the poet has to teach, may be agreeably diſguiſed.

POINCIANA, Barbadoes flower-fence, in botany, a plant which riſes with a ſtrait ſtalk ten or twelve feet high, which is covered with a ſmooth grey bark, and dividing into ſeveral ſpreading branches at the top, which are armed at each joint with two ſtrong crooked ſpines, and are furniſhed with compound alated leaves, each being compoſed of ſix or eight pair of ſimple winged leaves, the lower pair being compoſed of four or five pair of lobes, the others gradually increaſing in their number toward the top, where they decreaſe, and become ſmaller; the lobes are about three quarters of an inch long, and almoſt half an inch broad at their points, leſſening gradually to their baſe: they are of a light green, and when bruiſed, emit a ſtrong odour. The branches are terminated by looſe ſpikes of flowers, the footſtalk of each flower is near three inches long, the flower is compoſed of five unequal petals, four of which are roundiſh, and nearly equal; the fifth is larger, difform and crenated; the ſtamina are ten long ſetaceous filaments, terminated by oblong incumbent antheræ. The fruit is an oblong compreſſed pod, about three inches long, divided into three or four cells by tranſverſe partitions, each containing one flattiſh irregular ſeed. The flowers are beautifully variegated with a deep red, or orange-colour, yellow and ſome ſpots of green.

This plant grows naturally in both Indies, and at Barbadoes it is planted in hedges; it is alſo called by ſome Spaniſh carnation, with us it is propagated by ſeeds, which ſhould be ſown in a hot bed, and when come up, tranſplanted ſingly into ſmall pots, and placed in the tan-bed in the hot-houſe, where they muſt continually remain, obſerving to water and ſhift them when neceſſary.

POINT, a term uſed in various arts.

POINT, *Punctum*, in geometry, as defined by Euclid, is a quantity which has no parts, or which is indiviſible. Points are the ends or extremities of lines. If a point be ſuppoſed to be moved any way, it will, by its motion, deſcribe a line.

POINT *of contrary Flexure*. See the article FLEXURE.

POINT, in phyſics, the leaſt ſenſible object of ſight, marked with a pen, point of a compaſs, or the like. Of ſuch points all phyſical magnitude conſiſts. This phyſical point is the ſame with what Mr. Locke calls the point ſenſible, and which he defines to be the leaſt particle of matter, or ſpace, we can diſcern. He adds, that to the ſharpeſt eye, this is ſeldom leſs than thirty ſeconds of a circle, whereof the eye is the center.

POINT, in grammar, a character uſed to mark the diviſions of diſcourſe. A point proper, is what we otherwiſe call a full ſtop or period.

POINT, in muſic, a mark or note antiently uſed to diſtinguiſh the tones or ſounds; hence we ſtill call it ſimple counter-point, when a note of the lower part anſwers exactly to that of an upper; and figurative counter-point, when any note is ſyncopated, and one of the parts makes ſeveral notes or inflections of the voice, while the other holds only one.

We ſtill uſe a point, to raiſe the value of a note, and prolong its time by one half, e. g. a point added to a ſemibreve inſtead of two minims, make it equal to three; and ſo of the other notes. See the article TIME.

POINT, in aſtronomy, a term applied to certain points or places, marked in the heavens, and diſtinguiſhed by proper epithets.

The four grand points or diviſions of the horizon, viz. the eaſt, weſt, north, and ſouth, are called the cardinal points. See the articles HORIZON, EAST, WEST, &c.

The zenith and nadir are the vertical points: the points wherein the orbits of the planets cut the plane of the ecliptic, are called the nodes: the points wherein the equator and the ecliptic interſect, are called the equinoctial points; particularly, that whence the ſun aſcends toward the north pole, is called the vernal point; and that by which he deſcends to the ſouth pole, the autumnal point. The points of the ecliptic, where the ſun's aſcent above the equator, and deſcent below it, terminate, are called the ſolſticial point; particularly the former of them, the eſtival or ſummer-point; the latter, the brumal or winter-point.

POINT *of the Horizon*, or *Compaſs*, in navigation and geography. See the articles HORIZON and COMPASS.

POINT, is alſo uſed for a cape or head-land, jetting out into the ſea: thus ſeamen ſay, two points of land are in one another, when they are ſo in a right-line againſt each other, as that the innermoſt is hindered from being ſeen by the outermoſt.

POINT, is alſo an iron or ſteel inſtrument, uſed with ſome variety in ſeveral arts.

Engravers, etchers, cutters in wood, &c. uſe points to trace their deſigns, on the copper, wood, ſtone, &c.

POINT, in the manufactories, is a general term, uſed for all kinds of laces, wrought with the needle; ſuch are the point de Venice, point de France, point de Genoa, &c. which are diſtinguiſhed by the particular œconomy and arrangement of their points.

POINT, in poetry, denotes a lively briſk turn or conceit, uſually found or expected at the cloſe of an epigram.

POINT-BLANK, in gunnery, denotes the ſhot of a gun levelled horizontally. See the article GUNNERY.

POINTED, in heraldry. A croſs pointed, is that which has the extremities turned off into points by ſtraight lines.

POINTING, in grammar, the art of dividing a diſcourſe, by points, into periods and members of periods, in order to ſhew the proper pauſes to be made in reading, and to facilitate the pronunciation and underſtanding thereof.

POINTING, in war, the levelling a cannon, or mortar, ſo as to play againſt any certain point.

POINTING, among ſeamen, marking on the chart in what part or place the veſſel is.

POINTING *the Cable*, in the ſea-language, is untwiſting it at the end, leſſening the yarn, twiſting it again, and making all faſt with a piece of marline, to keep it from ravelling out.

POISON, in medicine, a malignant quality in ſome animal, vegetable, or mineral body, which renders it hurtful, and even mortal to thoſe who take it.

To Poison *a Piece*, with gunners, is the ſame as to clog and nail it up.

Poison-Tree, *Toxicodendron*, in botany. See the article Toxicodendron.

POLAR, in general, ſomething relating to the poles of the world, or poles of the artificial globes: thus we meet with polar circles, polar dial, polar projection, &c.

POLARITY, the quality of a thing conſidered as having poles; but chiefly uſed in ſpeaking of the magnet.

POLE, ϖολος, in aſtronomy, one of the extremities of the axis, on which the ſphere revolves.

Theſe two points, each 90° diſtant from the equinoxial or equator, are, by way of eminence, called the poles of the world; and the extremities of the axes of the artificial globes, correſponding to theſe points in the heavens, are termed the poles thereof.

Pole, in ſpherics, a point equally diſtant from every part of the circumference of a great circle of the ſphere, as the center is in a plane figure; or it is a point 90° diſtant from the plane of a circle, and in a line, called the axis, paſſing perpendicularly through the center. The zenith and nadir are the poles of the horizon; and the poles of the equator are the ſame with thoſe of the ſphere.

Poles *of the Ecliptic*, are two points on the ſurface of the ſphere, 23° 30′ diſtant from the poles of the world, and 90° diſtant from every part of the ecliptic.

Poles, in magnetics, are two points of a loadſtone, correſponding to the poles of the world; the one pointing to the north, the other to the ſouth. See the article Magnet.

Pole, or *Vertex*, *of a Glaſs*, in optics, is the thickeſt part of a convex, or the thinneſt of a concave-glaſs.

If the glaſs be truly ground, the pole will be exactly in the middle of its ſurface.

Pole, or Polar Star, is a ſtar of the ſecond magnitude, the laſt in the tale of Urſa Minor.

Pole-Cat, *Putorius*. See the article Putorius.

POLEMICAL, in matters of literature, an appellation given to books of controverſy, eſpecially thoſe in divinity.

POLEMONIUM, Greek-valerian, in botany, a plant, whoſe ſtalks riſe near a foot and a half high; they are hollow and channeled, and furniſhed with winged leaves, compoſed of ſeveral pair of folliculi, placed alternately from the extremities of the ſtalks; the flowers come out in bunches, and are of a beautiful blue colour, each is compoſed of a wheel-ſhaped petal, with a ſhort tube, and cut into five roundiſh ſegments at the extremity: they appear in May or June, and are ſucceeded by oval, acute pointed, three-cornered capſules, each having three cells, which are filled with irregular-pointed ſeeds. This plant is eaſily propagated by ſowing the ſeeds in the ſpring.

The leaves of this plant are accounted deterſive.

POLEMOSCOPE, in optics, a kind of reflecting perſpective-glaſs invented by Hevelius, who commends it as uſeful in ſieges, &c. for diſcovering what the enemy is doing, while the ſpectator lies hid behind an obſtacle.

POLIANTHES, the tuberoſe, in botany. See the article Tuberose.

POLICY, or Polity, in matters of government. See the article Polity.

Policy, among letter-founders, denotes a certain proportion, obſerved among the letters that compoſe a fount; or a rule, whereby to regulate the number of each.

POLISHER, or Burnisher, among mechanics, an inſtrument for poliſhing or burniſhing things proper to take a poliſh.

The guilders uſe an iron poliſher to prepare their metals before guilding, and the blood-ſtone to give them the bright poliſh after gilding.

POLISHING, in general, the operation of giving a gloſs or luſtre to certain ſubſtances, as metals, glaſs, marble, &c. See the articles Metal, Glass, &c.

POLITICAL, in general, ſomething relating to policy or government.

POLITICS, the firſt part of œconomy, conſiſting in the well governing and regulating the affairs of a ſtate, for the maintenance of the public ſafety, order, tranquility, and morals.

POLITY, or Policy, ϖολιτεια, denotes the peculiar form and conſtitution of the government of any ſtate or nation; or the laws, orders, and regulations relating thereto.

Polity differs only from politics, as the theory from the practice of any art. See the articles Law, Government, &c.

Some divide polity into agoranomy, or the regulations relating to mercantile affairs; and aſtynomy, or thoſe which concern the judiciary government of the citizens: ſome add other branches, viz. thoſe relating to eccleſiaſtical and military affairs.

POLL, a word uſed in ancient writings for the head: hence to poll, is either to vote or to enter down the names of thoſe perſons who give in their votes at an election.

Poll-Money, a capitation or tax, impoſed by the authority of parliament on the head or perſon, either of all indifferently, or according to ſome known mark of diſtinction.

POLLARD, among hunters, a ſtag which has caſt his horns.

Pollard, or Pollenger, in agriculture, ſignifies a tree that has been frequently polled, or lopped.

POLLEN, among botaniſts, the ſame as farina. See the article Farina.

POLLEX, in anatomy, denotes either the thumb or great toe, according as either manus or pedis is added to it.

POLLUTION, in general, ſignifies defilement, or the rendering a perſon, or place, unclean or unholy.

POLLUTION, in medicine, a diſeaſe which conſiſts in an involuntary emiſſion of the ſeed in the time of ſleep.

POLLUX, in aſtronomy, a fixed ſtar of the ſecond magnitude in the conſtellation Gemini, or the twins.

The ſame name is alſo given to the hindermoſt twin, or poſterior part of the ſame conſtellation.

POLVERINE, in commerce, the aſhes of the herb kali, preſerved for the uſe of making glaſs.

POLIACANTHA, in botany, the ſame with the carduus, or thiſtle; which ſee.

POLYADELPHIA, the name of the eighteenth claſs in the Linnæan Syſtem of Botany, and conſiſts of ſuch plants whoſe flowers are hermaphrodite, and furniſhed with ſeveral ſets of united ſtamina in each.

Of this claſs is the citron, orange, lemon, St. John's-wort, &c.

POLYANDRIA, the name of the thirteenth claſs of plants in the Linnæan Syſtem of Botany; comprehending ſuch plants whoſe flowers are hermaphrodite, and furniſhed with many ſtamina, or male parts, in each; theſe always exceed the number of twenty, and are inſerted in the receptacle.

To this claſs belong the piony, larkſpur, aconite, columbine, helebore, with ſeveral other genera; the fruits of ſome of them are of a poiſonous quality.

POLIANTHUS, in botany, a beautiful garden flower of the primroſe kind; the varieties of this is innumerable, being produced from ſeeds, which ſhould be ſown in February, either in borders, boxes, or pots, and ſhould have an eaſt aſpect, ſo as to be ſhaded from the heat of the day; in May they will be fit to be planted out for good, which ſhould be in a ſhady border of ſtrong rich earth, at about ſix inches aſunder, and the ſucceeding ſpring they will ſhew their bloſſoms, when their goodneſs may be judged of.

As the properties of a good polyanthus are ſimilar to thoſe of the auricula, we, therefore, to prevent repetition, refer the reader to the article AURICULA, where they are fully explained.

POLYCARPON, in botany, a genus of plants, whoſe flower conſiſts of five oblong, emarginated, very ſhort petals, with three ſlender filaments topped with roundiſh antheræ; the fruit is an ovate unilocular capſule, opening with three valves, and contains a number of oval ſeeds.

POLYCHREST, in pharmacy, a medicine that ſerves for many uſes, or that cures many diſeaſes.

Sal POLYCHREST, a compound ſalt, made of equal parts of ſalt-petre and ſulphur, laid on a red hot crucible.

POLYCNEMUM, in botany, a genus of plants, whoſe flower hath no corolla; the cup is formed of five erect, lanceolated, pointed leaves, with three capillary filaments, topped with obtuſe antheræ: the ſeed, which ſucceeds the flower, has ſcarce any covering, or at moſt only a very thin membrane.

POLYGALA, milk-wort, in botany, a genus of plants, producing papilionaceous flowers; the fruit is a turbinated heartſhaped capſule, with two cells and two valves, each containing an ovate ſeed.

The polygala-vulgaris grows naturally in many parts of England; it hath a perennial woody root, with three or four trailing herbaceous ſtalks, furniſhed with linear ſpear-ſhaped leaves; the flowers are produced at the top of the ſtalks, and are of a blue, purple, or white colour.

It is ſuppoſed, that cattle which feed on this plant, give a greater quantity of milk than uſual; and therefore it is reckoned good for nurſes for the ſame purpoſe.

POLYGALA VIRGINIANA, rattle-ſnake-root, is a ſpecies of the former; it grows naturally in many parts of North-America. The root of this plant is perennial, and compoſed of ſeveral fleſhy fibres, variouſly bent or contorted; it is yellowiſh without, but white within, and has an acrid bitteriſh taſte, but ſomewhat aromatic: from the root ariſes three or four branching ſtalks, which grow erect, upwards of a foot high, and furniſhed with oblong, ſpear-ſhaped leaves, placed alternately; the flowers are produced in looſe ſpikes at the ends of the branches, theſe are ſmall and of a white colour.

The root of this ſpecies is looked upon, in America, as a ſpecific againſt the bite of the rattle-ſnake, and has been long uſed by the Senega Indians for that purpoſe, which, if taken in time, is an infallible remedy: the Indians, when they travel in the woods, carry about them this root in powder, leſt they ſhould be bit by the rattle-ſnake, and whenever this happens, they take a quantity of the powder inwardly, and apply ſome of it to the part bitten, which is a certain cure, and of late years it hath been uſed by the inhabitants of Virginia in many diſorders, which are occaſioned by a thick ſizy blood; ſo that the root of this plant, when its virtues are fully known, may become one of the moſt uſeful medicines yet diſcovered.

POLIGAMIA, in botany, the name of the twenty-third claſs of plants in the Linnæan Syſtem; comprehending thoſe which produce (either upon the ſame or different plants) hermaphrodite flowers, and alſo flowers of one ſex only, be it male or female, or flowers of each ſex.

Of this claſs there are three orders or ſubdiviſions, whereof the firſt conſiſts of ſuch polygamious plants, as contain the different kinds of flowers on different parts of the ſame plant, and hence called polygamia-monoetia; ſuch are the plantain-tree, white-helebore,

bore, maple, orach, &c. the ſecond order comprehends ſuch polygamious plants as have their different flowers not on the ſame individual plant, but on diſtinct ones of the ſame ſpecies, and hence called polygamia dioecia ; of this order are the aſh, amber tree, ginſeng, &c. The third order, called polygamia-trioecia, comprehends ſuch plants as have the polygamy on three diſtinct plants; this order contains but one genus, which is the fig-tree.

POLYGAMY, a plurality of wives or huſbands, in the poſſeſſion of one man or woman, at the ſame time.

POLYGLOTT, ϖολυγλοττος, among divines and critics, chiefly denotes a bible printed in ſeveral languages. In theſe editions of the holy ſcriptures, the text in each language is ranged in oppoſite columns. The firſt polyglott Bible, was that of cardinal Ximenes, printed in 1517, which contains the Hebrew text, the Chaldee paraphraſe on the Pentateuch, the Greek verſion of the LXX. and the antient Latin verſion. After this, there were many others, as the Bible of Juſtiniani, biſhop of Nebio, in Hebrew, Chaldee, Greek, Latin, and Arabic; the Pſalter by John Potken, in Hebrew, Greek, Ethiopic, and Latin; Plantin's polyglott Bible, in Hebrew, Chaldee, Greek, and Latin, with the Syriac verſion of the New Teſtament; M. le Jay's Bible, in Hebrew, Samaritan, Chaldee, Greek, Syriac, Latin, and Arabic; Walton's polyglott, which is a new edition of Le Jay's polyglott, more correct, extenſive, and perfect, with ſeveral new oriental verſions, and a large collection of various readings, &c.

POLYGON, in geometry, a figure with many ſides, or whoſe perimeter conſiſts of more than four ſides at leaſt: ſuch are the pentagon, hexagon, heptagon, &c. See the articles PENTAGON, HEXAGON, &c.

POLYGON, in fortification, denotes the figure of a town, or other fortreſs.

The exterior or external polygon, is bounded by lines drawn from the point of each baſtion, to the points of the adjacent baſtions.

And the interior polygon, is formed by lines joining the centers of the baſtions.

Line of POLYGONS, on the French ſectors, is a line containing the homologous ſides of the firſt nine regular polygons inſcribed in the ſame circle; that is, from an equilateral triangle, to a dodecagon.

POLYGONAL NUMBERS, are ſo called, becauſe the units whereof they conſiſt may be diſpoſed in ſuch a manner, as to repreſent ſeveral regular polygons. See NUMBER.

The ſide of a polygonal number, is the number of terms of the arithmetical progreſſion that compoſe it; and the number of angles is that which ſhews how many angles that figure has, whence the polygonal number takes its name.

POLYGONATUM, Solomon's ſeal, in botany, is ranked by Linnæus among the convallaria. See the article CONVALLARIA.

The root of this plant is a famous vulnerary; for being applied in form of a poultice, it not only heals freſh wounds, but takes away the marks of bruiſes, &c.

POLYGONUM, knot-graſs, in botany, a genus of plants, whoſe flower is apetalous, but the cup is of a turbinated form, coloured withinſide, and divided into five oval ſegments at the limb; there is no pericarpium, but the ſeed, which is ſingle, three-cornered, and pointed, is contained in the cup.

To this genus Linnæus has joined the biſtorta, perſecaria, and fagopyrum of Tournefort. An infuſion of the common knot graſs is a valuable aſtringent medicine in hæmorrhages of all kinds.

POLYGYNIA, amongſt botaniſts, an order or ſubdiviſion of a claſs of plants in the Linnæan ſyſtem, comprehending ſuch plants of that claſs as have a great number of piſtils, or female organs of generation. ſee the articles PISTIL and GENERATION.

POLYHEDRON, in geometry, denotes a body or ſolid comprehended under many ſides or planes.

A gnomonic polyhedron is a ſtone with ſeveral faces, wherein are deſcribed various kinds of dials. See the article DIAL.

POLYHEDRON, polyſcope, in optics, is a multiplying-glaſs, or lens, conſiſting of ſeveral plane ſurfaces diſpoſed into a convex form. See the article LENS.

POLYHISTOR, a perſon of great and various erudition; whence

POLYMATHY, ϖολυμαθια, denotes the knowledge of many arts and ſciences.

POLYMNIA, in botany, a genus of plants, producing compound radiated flowers; the hermaphrodite florets which form the diſc are numerous, funnel-ſhaped, and quinquifid; the female florets compoſe the rays, and are ligulated and tridentated; the florets of the diſc are abortive, but the female ones produce ſolitary, ovate, gibbous, and naked ſeeds, placed on a paleaceous, convex, imbricated receptacle.

POLYMYTHY, ϖολυμυθια, in poetry, a fault in an epic poem, when inſtead of a ſingle mythos, or fable, there is a multiplicity of them.

POLYNOMIAL, or MULTINOMIAL, in algebra. See the article MULTINOMIAL.

POLYOPTRUM, in optics, a glaſs through which objects appear multiplied, but diminiſhed.

POLYPE, or POLYPUS, in zoology, a ſmall freſh-water inſect of a cylindric figure, but variable, with very long tentacula.

There is ſcarce an animal in the world more difficult to deſcribe than this ſurpriſing inſect; it varies its whole figure at pleaſure, and is frequently found beſet with young in ſuch a manner, as to appear ramoſe and divaricated; theſe young ones adhering to it in ſuch a manner as to appear parts of its body.

When ſimple and in a moderate ſtate as to contraction or dilatation, it is oblong, ſlender, pellucid, and of a pale reddiſh colour: its body is ſomewhat ſmaller towards the tail, by which it affixes itſelf to ſome ſolid body; and larger toward the other extremity, where it has a large opening, which is the mouth, around which are the tentacula, which are eight in number, and one uſually extended to about half the length of its body. By means of its tentacula, or arms, as they are commonly called, expanded into a circle of more than half a foot diameter, the creature feels every thing that can ſerve it for food; and ſeizing the prey with one of them, calls in the aſſiſtance of the others, if neceſſary, to conduct it to its mouth.

The production of its young is different from the common courſe of nature in other animals; for the young one iſſues from the ſide of its parent in the form of a ſmall pimple, which lengthening every hour, becomes, in about two days, a perfect animal, and drops from off its parent to ſhift for itſelf: but before it does this, it has often another growing from its ſide; and ſometimes a third from it, even before the firſt is ſeparated from its parent; and what is very extraordinary is, that there has never yet been diſcovered among them any diſtinction of ſex, or appearance of copulation; every individual of the whole ſpecies being prolific, and that as much if kept ſeparate, as if ſuffered to live among others: but what is ſtill even more ſurpriſing, is the reproduction of its ſeveral parts when cut off; for when cut into a number of ſeparate pieces, it becomes in a day or two ſo many diſtinct and ſeparate animals; each having the property of producing a head and tail, and the other organs neceſſary for life, and all the animal functions. There are ſeveral other ſpecies of this animal, moſt of which are found in our ditches. See plate LXXIII. where fig. 11. repreſents a cluſter-polype, extending itſelf; and fig. 12. is the ſame polype after being ſoaked in water, and the tentacula, or branches laid ſtraight.

POLYPETALOUS, among botaniſts, an epithet applied to ſuch flowers as conſiſt of ſeveral petals, or flower-leaves. See the article Flowers.

POLYPODIUM, polypody, in botany, a genus of cryptogamious plants of the fern kind, the fructifications of which are diſtributed in round ſpots on the under ſurface of the leaf.

The polypodies are not branched, but conſiſt of ſingle leaves, divided almoſt to the middle-rib into oblong jaggs, or ſegments. Both the root and leaves are uſed in medicine, being a gentle cathartic, and recommended in obſtructions of the viſcera.

POLYPREMUM, in botany, a genus of plants, whoſe flower is monopetalous and rotated, with the limb cut into five ſegments; the ſtamina are four very ſhort filaments, topped witn roundiſh antheræ. The fruit is an ovate emaginated capſule, compreſſed at the top, containing two valves and two cells, which incloſe a great number of ſeeds.

POLYPUS, or Polypus *of the Heart*, in medicine, a maſs compoſed of various pellicles and fibres generated in the heart and large veſſels.

Polypuses *of the Lungs*, are viſcous excretions of the ſmall glands, formed in the deeper branches of the aſpera arteria, and frequently miſtaken for pieces of the blood-veſſels or lungs.

Polypus *of the Noſe*, a fleſhy excreſcence, in the inſide of the noſtrils, which is of various ſizes, and of different conſiſtencies; ſometimes theſe excreſcences are ſoft, ſometimes they are capable of elongation, and at other times they turn hard and rigid.

POLYPYRENEOUS, an appellation given to fruits, containing ſeveral kernels, or ſeeds.

POLYSCOPE, in optics, the ſame with polyhedron. See Polyhedron.

POLYSPASTON, in mechanics, a machine conſiſting of an aſſembage of ſeveral pullies; for the nature and force of which, ſee the article Pulley.

POLYSPERMOUS, among botaniſts, ſuch plants as have more ſeeds than four ſucceeding each flower, without any certain order.

POLYSYLLABLE, in grammar, a word conſiſting of more ſyllables than three; for when a word conſiſts of one, two, or three ſyllables, it is called a monoſyllable, diſſyllable, and triſyllable.

POLYSYNDETON, in grammar and rhetoric, a figure whereby a redundance of conjunctions, eſpecially copulative ones, is uſed.

POLYTHEISM, in matters of religion, the doctrine or belief of a plurality of gods.

POLYTRICHUM, in botany, a genus of moſſes, producing ſeparate pedicles ſupporting male and female parts; the pedicles always growing out of the extremities of the ſtalks; the calyptra is conic, equal, and ſometimes hairy; the antheræ is oblong; and in the female part the cup is coloured, and contains a ſlender jointed piſtil.

POMATUM, an ointment made thus: Take of freſh hog's lard, and beat it into cream with roſe-water, and ſcent it with oil of lemons, thyme, or the like. Pomatums are alſo occaſionally perfumed with the odours of jeſſamines, oranges, jonquils, tuberoſes, &c. They are principally uſed for pimples, and foulneſſes of the ſkin.

POMEGRANATE-Tree, *Punica*, in botany, a genus of plants, whoſe flower conſiſts of five roundiſh, erect, patent petals, inſerted in the cup, which alſo contains a great number of capillary filaments topped with oblong antheræ. The fruit is a large globoſe apple, crowned with the cup, and formed into nine cells: the ſeeds are numerous, roundiſh, and ſucculent; the receptacle is membranaceous, and divides every cell into two parts.

There are ſeveral varieties of pomegranate trees, which grow naturally in Spain, Portugal, Italy, &c. as alſo in the Weſt-Indies: theſe plants are cultivated in England more for the beauty of their fine ſcarlet flowers than their fruit, which rarely comes to perfection with us; they are eaſily propagated by laying down their branches in the ſpring, which in one year's time will take good root, and may then be tranſplanted where they are deſigned to remain; the beſt ſeaſon to move them is juſt before they begin to ſhoot; the flowers always proceed from the extremity of the branches, which are produced the ſame year; for which reaſon all the weak branches of the former year ſhould be cut out, and the larger lengthened according to their ſtrength; the time for this operation is the beginning of October. The moſt admired ſort is that which produces double flowers, the cup of which is the balauſtine of the ſhops. Pomegranates are of various ſizes, ſome being as big as large apples; the rind is pretty thick, hard and brittle; before it is ripe it is green and ſmooth, but afterward reddiſh and wrinkled, and laſt of all it becomes of a bay colour and yellowiſh within, and has an aſtringent taſte; the pulp has a ſweetiſh vinous flavour, though it is ſometimes acid. This fruit differs but little in its medicinal virtues from quinces; the juice is good for weakneſſes of the ſtomach and bowels, and removes nauſeas, vomitings, and fluxes; it is reckoned alſo a good cooler in inflammatory fevers: the rind of this tree, called malicorium, is more aſtringent than the juice, and has a bitteriſh auſtere taſte; it is therefore much ordered in decoctions againſt gonorrhæs and fluxes, and often in aſtringent clyſters. It will ſupply the place of oak bark for tanning leather, as well as of galls for making ink.

POMES, in heraldry, are green roundles, ſo called by the Engliſh heralds, who give diſtinct names to the different coloured roundles.

POMIFEROUS, in botany, an appellation given to apple-bearing trees. See the article Apple.

POMME', or Pommette', in heraldry, is a croſs with one or more balls or knobs at each of the ends.

POMMEL, or Pummel, in the manege, a piece of braſs, or other matter, at the top and in the middle of the ſaddle-bow.

Pommel, is alſo a round ball of ſilver, ſteel, or the like, fixed at the end of the guard, or graſp of a ſword, to ſerve, in ſome meaſure, as a counterpoiſe.

POMPHOLYX, in the materia medica, a ſemimetallic recriment, very nearly allied in its nature to tutty; being a kind of flowers of zinc or calamine, ſublimed higher than tutty, and carrying leſs of any metalline particles with it.

POMPION, in botany. See Cucurbita.

POMUM, apple. See Apple.

Pomum, among botaniſts, is alſo underſtood to be a fleſhy or pulpy pericarpium, without a valve, and containing a capſule; therefore, by Linnæus, the fruit of the melon, cucumber, gourd, momordica, &c. is called pomum.

POND-Weed, *Potamogeton*, in botany. See the article Potamogeton.

PONE, in law, a writ whereby a cauſe depending in an inferior court, is removed into the king's-bench, or common-pleas.

PONIARD, a little pointed dagger, very ſharp edged: it is now little uſed, except among aſſaſſins.

PONS Varoli, in anatomy, the upper part of a duct in the third ventricle of the brain. See the article Brain.

PONTEDERIA, in botany, a genus of plants, whoſe flower conſiſts of ſix petals, which are divided, and form a kind of lip; the three upper ones are erect, and the three under reflexed; the filaments are ſix, and inſerted in the corolla, and terminated with oblong antheræ. The fruit is a conic fleſhy capſule, of a triangular figure, containing three cells, which are filled with roundiſh ſeeds.

PONTIFEX, Pontif, or high prieſt, a perſon who has the ſuperintendance and direction of divine worſhip, as the offering of ſacrifices, and other religious ceremonies.

PONTIFICATE, is uſed for the ſtate or dignity of a pontiff, or high prieſt; but more particularly, in modern writers, for the reign of a pope.

PONTON, or Pontoon, in war, denotes a little floating bridge made of boats and planks. The late invented ponton is of copper furniſhed with an anchor, &c. to fix it. To make a bridge, ſeveral of theſe are diſpoſed two yards aſunder, with beams acroſs them; and over thoſe are put boards or planks. They are alſo linked to each other, and faſtened on each ſide the river by a rope run through a ring in each of their heads, and fixed to a tree or ſtake on either ſhore: the whole makes one firm uniform bridge, over which a train of artillery may paſs.

PONT Volant, flying bridge. See the article Bridge.

POOL, is properly a reſervoir of water ſupplied with ſprings, and diſcharging the overplus by ſluices, defenders, weirs, and other cauſeways.

Mill-Pool, a ſtock of water by whoſe force, &c. the motion of a mill is effected. See the article Mill.

POOP, *Puppis*, the ſtern of a ſhip, or the higheſt, uppermoſt, and hinder part of the ſhip's hull. See the articles Stern and Ship.

POOR, in law, an appellation given to all perſons who are in ſo low and mean a condition, as that they either are, or may become, a burden to a pariſh.

Hence under the term poor, may be included thoſe who are ſo through impotency; as the aged, the blind, the lame, the fatherleſs and motherleſs, perſons labouring under ſickneſs, or who are idiots, lunatics, &c. for all whom the overſeers of the poor are obliged to provide.

There is alſo another kind of poor, on account of caſualties and misfortunes; as decayed houſe-keepers, and thoſe who have been ruined either by fire, water, robbery, or loſſes in trade, &c. all of whom, being able, are to be ſet to work, and otherwiſe relieved by the pariſh; and it is the ſame with reſpect to poor perſons overcharged with children, diſabled labourers, &c.

Before the reign of queen Elizabeth, we had few or no laws for the relief of the poor of this kingdom; but then a ſtatute was made enacting, that the church-wardens of every pariſh, and two or more houſholders, are to be nominated and appointed yearly in Eaſter week, by two juſtices of the peace, as overſeers of the poor; which ſaid overſeers ſhall meet once a month at the pariſh church, there to conſider of proper ways to relieve the poor, &c. And with the aſſiſtance of the juſtices, they may make a rate on every inhabitant of the pariſh, and occupier of lands, houſes, tithes; as alſo perſonal eſtate, to raiſe a ſtock for imploying of the poor, relieving the impotent, and others not able to work, the placing poor children out apprentices, and erecting cottages for poor perſons, &c.

POPE, *Papa*, the ſovereign pontiff, or ſupreme head of the Romiſh church. The appellation of pope was antiently given to all Chriſtian biſhops, but about the latter end of the eleventh century, in the pontificate of Gregory VII. it was uſurped by the biſhop of Rome, whoſe peculiar title it has ever ſince continued.

POPLAR, *Populus*, in botany, a genus of trees producing male and female flowers on ſeparate plants, growing in an oblong amentum, looſely imbricated, and compoſed of ſcales which are oblong, plain, and cut at their margin; the corolla has no petals, but conſiſts of a monophyllous nectarium, turbinated at bottom, and tubulated at top; the ſtamina are eight very ſhort filaments, topped with large, tetragonal antheræ. The fruit is an ovate bilocular capſule, containing a number of oval ſeeds covered with a hairy down. There are different ſpecies of this genus, as the white poplar or abele tree, the black poplar, the aſpen tree, the Carolina poplar, &c. They are propagated either by layers, or large cuttings, planted in February, in a moiſt ſoil, where they will readily take root.

The beſt uſe theſe trees can be applied to, is for breaking off the weſterly or northerly winds, and to be planted in ſuch land where ſcarce any other tree will thrive, for the advantage as will ariſe from its timber; for the wood of theſe trees, eſpecially of the abele, is very good to lay for floors, where it will laſt many years; and for its exceeding whiteneſs, is by many perſons preferred to oak; but being of a ſoft contecture, is very ſubject to take the impreſſion of any thing hard and pointed, which renders it leſs proper for this purpoſe: it is alſo very proper for wainſcotting rooms, being leſs ſubject to ſwell or ſhrink than moſt other ſorts of wood; but for turnery ware there is no wood equal to this, for its exceeding whiteneſs; ſo that trays, bowls, and many other utenſils, are made of it: and the bellows-makers prefer it for their uſe; as do alſo the ſhoe-makers, for heels for womens ſhoes; and of this wood the ſhoes are made which are worn by the peaſants in France; it is alſo very good to make light carts; and the poles are very proper to ſupport vines, hops, &c. and the loppings will afford good fuel.

POPLES, in anatomy, the inner part of a juncture, whereby the thigh bone is articulated with the tibia.

POPLITEA, in anatomy, a name given to the third vein of the leg, ariſing from the heel, where it is formed out of ſeveral branches, coming both from the heel and ancle. It lies pretty deep in the fleſh, and aſcending up to the ham, terminates in the crural vein.

POPPY, *Papaver*, in botany, a genus of plants, whoſe flower conſiſts of four roundiſh, plane, patent petals, narroweſt at the baſe, and alternately ſmaller; the filaments are numerous, capillary, and topped with oblong, compreſſed, erect antheræ. The fruit is a large capſule, crowned by a plain ſtigma, and opening in many holes under it: the ſeeds are numerous and very ſmall, and the receptacles are longitudinal plicæ, of the ſame number with the rays of the ſtigmata, and growing to the ſides of the capſule.

Of poppies there are ſeveral ſpecies; thoſe cultivated in gardens are double and extremely beautiful, vieing with the fineſt carnations for ſtripes and colours, and have nothing to diſcountenance their having a place amongſt the moſt brilliant collection, but their ſhort duration and offenſive ſmell. They are propagated by ſowing the ſeeds in autumn, or early in the ſpring, in the places where they are intended to flower. The heads of the fruit of poppies contain a milky juice, which may be collected in a conſiderable quantity, by ſlightly wounding them when almoſt ripe; this expoſed for a few days to the air, thickens into a clammy maſs, the ſame as opium, which is an extract from the heads of the white or Turky poppy. See the article OPIUM. The ſeeds of the white poppy are uſed in emulſions, being cooling, and good in fevers and inflammatory diſtempers, as alſo for the ſtranguary and heat of urine.

Prickly POPPY. See ARGEMONE.

Spatling POPPY. See CUCUBALUS.

POPULAGO, in botany, Tournefort's name for the caltha. See CALTHA.

POPULAR, *Popularis*, ſomething that relates to the common people.

POPULUS, the poplar tree. See the article POPLAR.

PORCELAIN, or PURCELAIN, a fine ſort of earthen-ware, chiefly manufactured in China, and thence called china-ware. See the article CHINA-WARE.

PORCELAIN-SHELL, *Porcellana*, in natural hiſtory, a genus of ſhell fiſh, with a ſimple ſhell without any hinge, formed of one piece, and of a gibboſe figure on the back; the mouth is long, narrow and dentated on each ſide; and the animal inhabiting it is a limax.

PORCH, in architecture, a kind of veſtible ſupported by columns; much uſed at the entrance of the antient temples, halls, churches, &c.

PORCUPINE, *Hyſtrix*, in zoology, a very ſingular genus of quadrupeds, belonging to the order of the glires.

The fore-teeth of the porcupine are obliquely truncated, and it has no canine teeth: its ears are of a figure approaching to round, and the body is covered with prickles, or ſpines, and alſo with briſtles, like thoſe of a hog. The ſpines or quills, as they are commonly called, are of two kinds; ſome being ſhorter, thicker, ſtronger, and more ſharp-pointed; and others longer, weaker, and more flexible: theſe laſt are a foot long, and compreſſed at the point. The ſpines of the firſt kind are white at the baſe, and of a duſky cheſnut-colour on the upper part; and the latter kind are white at each extremity, and variegated with black and white in the middle. This terrible covering makes the creature appear much larger than it really is: it ſomewhat reſembles the badger in ſhape; and its length, from the noſe to the tail, is about two feet.

PORE, in anatomy, a little interſtice or ſpace between the parts of the ſkin, ſerving for perſpiration. See the articles CUTIS and PERSPIRATION.

PORELLA, in botany, a genus of moſſes, the anthera of which is oblong, and opening in holes on many ſides; the other parts are too minute to be deſcribed.

POROPHYLLUM, in botany, the ſame with the cacalia of Linnæus. See the article CACALIA.

PORPESSE, in ichthyology, a ſpecies of the delphinus, with a coniform body, a broad back, and a ſubacute roſtrum: it is a very large fiſh, frequently confounded with the dolphin, from which it is different.

PORPHYRY, in natural hiſtory, a kind of ſtone of a plain uniform maſs, ſpotted with ſeparate concretions, of great hardneſs, giving fire with ſteel, not fermenting with acids, and very ſlowly and difficultly calcining in a ſtrong fire.

PORRUM, the leek, in botany, a well known ſpecies of the cepa, or onion, with which it agrees both in botanical characters and medicinal virtues, being only accounted weaker. See the article ONION.

PORT, a commodious place ſituated on the ſea-coaſt, or at the mouth of a river, ſcreened from the wind and the enterprizes of an enemy, with depth of water ſufficient for ſhips of burden, and where veſſels lie by to load and unload.

Ports are either natural or artificial; the natural are thoſe formed by providence, and the artificial ſuch as are formed with moles running into the ſea.

Free-PORT, in commerce, a port in which merchants of all nations may load and unload their veſſels, without paying any duties or cuſtoms; as thoſe of Leghorn, Genoa, &c.

PORT, among ſailors, denotes the larboard, or left ſide of the ſhip: thus to port a helm, is to put it on the left ſide of the ſhip, that the ſhip may go to the right.

PORT-CRAYON, a pencil-caſe, which is uſually four or five inches long, and contrived ſo as that the pencil may ſlide up and down. Its inſide is round, and its outſide is ſometimes filed into eight ſides or faces, on which are drawn the ſector lines: ſometimes it is made round both withoutſide and within, and has its length divided into inches and parts of inches.

PORT-GREVE, or PORT-GRAVE, was formerly the principal magiſtrate of maritime towns. The chief magiſtrate of London was antiently called by this name, till Richard I. cauſed the city to be governed by two bailiffs; ſoon after which, king John granted the city a mayor.

PORT-HOLES, in a ſhip, are the holes in the ſide of the veſſel, through which are put the muzzles of the great guns. Theſe are ſhut up in ſtorms, to prevent the water from driving through them. The Engliſh, Dutch, and French ſhips, have the valves, or caſements, faſtened at the top of the port-holes, and the Spaniſh veſſels aſide of them.

PORT-LAST, the ſame with the gun-wale of a ſhip. See GUN-WALE.

The yard is down a-port-laſt, when it lies down on the deck.

PORT-ROYAL, the name of two monaſteries of Ciſtercian nuns, in the dioceſe of Paris; the one near Chevreuſe, at the diſtance of five leagues from Paris, called Port-Royal of the Fields, and the other in Paris, in the Suburbs of St. James.

PORT-VENT, in an organ, is a wooden pipe which ſerves to convey the wind from the bellows to the ſound-board. See the article ORGAN.

PORTA, or VENA-PORTA, in anatomy, one of the three primary veins of the human body.

PORTAIL, in architecture, the frontiſpiece of a church, viewed on the ſide on which is the great door.

Portail is alſo uſed for the great door of a palace, caſtle, &c.

PORTAL, in architecture, a little gate where there are two gates of a different bigneſs; alſo a little ſquare corner of a room cut off from the reſt by the wainſcot, and forming a ſhort paſſage into the room.

The ſame name is alſo ſometimes given to a kind of arch of joiners work before a door.

PORTERAGE, a duty paid at the cuſtom-houſe to thoſe who attend at the water-ſide, and belong to the package-office.

There are tables hung up aſcertaining the porterage for landing and ſhipping goods.

PORTICO, in architecture, a kind of gallery on the ground, ſupported by columns, where people walk under covert.

Though this word is derived from *porta*, a gate, or door, yet it is uſed for any diſpoſition of columns which form a gallery.

PORTIO, portion, a part or diviſion of any thing: thus portio dura, and portio mollis, in anatomy, is a portion of the ſeventh pair of nerves of the brain.

PORTION, in law, a part or proportion, either of money given with a daughter, or of an inheritance.

Portion, in the canon-law, is that proportion or allowance which a vicar receives out of a rectory or impropriation.

PORTIONER, is where a parſonage is ſerved by two or more clergymen alternately, in which caſe the miniſters are called portioners, becauſe they have only their proportion of the tythes or profits of the living.

PORTLAND-Stone, is a dull whitiſh ſpecies of pſadurium, much uſed in buildings about London: it is compoſed of a courſe grit, cemented together by an earthy ſpar; it will not ſtrike fire with ſteel, but makes a violent efferveſcence with aquafortis.

PORTLANDIA, in botany, a genus of plants, whoſe flower is monopetalous; the tube is long and ventricoſely funnel-ſhaped, and the border is ſhorter than the tube, and cut into five acute ſegments: the ſtamina are five ſubulated filaments, topped with linear erect antheræ: the fruit is an oval bilocular capſule, having five furrows and five angles, and contains a number of imbricated compreſſed roundiſh ſeeds.

PORTMANTEAU, a cloak-bag of cloth, leather, &c. in which the cloak, linen, and other habiliments of travellers are diſpoſed and laid on the horſe's crupper.

PORTRAIT, Pourtrait, or Pourtraiture, in painting, the repreſentation of a perſon, and eſpecially of a face done from the life.

PORTULACA, purſlane, in botany, a genus of plants, whoſe flower conſiſts of five plane, erect, obtuſe petals, larger than the cup, with many hairy ſtamina: the fruit is an ovate covered capſule, with one cell, containing many ſmall ſeeds.

The common garden purſlane is propagated by ſowing the ſeeds in any of the ſummer months; and where it is ſuffered to ſhed, it will naturally come up the ſucceeding ſummer. It is cultivated for culinary purpoſes, and is reckoned a great aſſuager of choleric heat; it is alſo accounted good in the ſcurvy, and all cutaneous eruptions.

PORUS, in general, denotes a pore. See the article Pore.

Porus Bilarius, according to ſome, is the ſame with the hepatic duct; but others make a diſtinction between them, and obſerve, that the ductus hepaticus runs from the liver to the ductus choledocus; and that the branches of this, diſtributed through the whole liver, make what are called the pori biliarii.

POSE', in heraldry, denotes a lion, horſe, or other animal, ſtanding ſtill, with all his four feet on the ground.

POSITION, or Situation, in phyſics, an affection of place, which expreſſes the manner of any body's being therein.

Position, or *the Rule of Falſe* Position, otherwiſe called *the Rule of* Falshood, in arithmetic, is a rule, ſo called, becauſe in calculating on ſeveral falſe numbers taken at random, as if they were the true ones, and from the differences found therein, the numbers ſought is determined. This rule is either ſingle or double.

Single poſition, is when there happens in the propoſition ſome partition of numbers into parts proportional, in which caſe the queſtion may be reſolved at one operation, by this rule. Imagine a number at pleaſure, and work therewith according to the tenor of the queſtion, as if it were the true number; and what proportion there is between the falſe concluſion and the falſe proportion, ſuch proportion the given number has to the number ſought. See the article Proportion.

Therefore, the number found by argumentation, ſhall be the firſt term of the Rule of Three; the ſecond number ſuppoſed, the ſecond term; and the given number, the third. See the article Rule *of Three*.

Or the reſult is to be regulated by this proportion, viz. As the total ariſing from the error to the true total, ſo is the ſuppoſed part to the true one. Example: A, B, and C, deſigning to buy a quantity of lead, to the value of 140 *l.* agree that B ſhall pay as much again as A, and C as much again as B; what then muſt each pay?

Now ſuppoſe A to pay 10*l.* then B muſt pay 20*l.* and C, 40*l.* the total of which is 70*l.* but ſhould be 140*l.* Therefore, if 70*l.* ſhould be 140*l.* what ſhould 10*l.* be?

Anſwer, 20*l.* for A's ſhare, which doubled makes 40*l.* for B's ſhare, and that again doubled gives 80*l.* for C's ſhare, the total of which is 140*l.*

Double poſition, is when there can be no partition in the numbers to make a proportion. In this caſe, therefore, you muſt make a ſuppoſition twice, proceeding therein according to the tenor of the queſtion. If neither of the ſuppoſed numbers ſolve the proportion, obſerve the errors, and whether they be greater or leſs than the ſuppoſition requires, and mark the errors accordingly with the ſigns + and —. See the article Character.

Then multiply contrarywiſe the one poſition by the other error, and if the errors be both too great, or both too little, ſubtract the one product from the other, and divide the difference of the products by the difference of the errors. If the errors be unlike, as the one + and the other —, add the products, and divide the ſum thereof by the ſum of the errors added together: for the proportion of the errors is the ſame with the proportion of the exceſſes or defects of the numbers ſuppoſed to be the numbers ſought: or the ſuppoſitions and their errors being placed as before, work by this proportion as a general rule, viz. as the difference of the errors, if alike (or their ſum, if unlike) to the difference of the ſuppoſitions, ſo either error to a fourth number, which accordingly added to or ſubtracted from the ſuppoſition againſt it, will anſwer the queſtion.

Position, in geometry, is a term ſometimes uſed in contradiſtinction to magnitude: thus, a line is ſaid to be given in poſition, *poſitione data*, when its ſituation, bearing, or direction, with regard to ſome other line is given: on the contrary, a line is given in magnitude, when its length is given but not its ſituation.

Position, is alſo uſed for a theſis or propoſition maintained in the ſchools. See the article Thesis.

POSITIVE, a term of relation ſometimes oppoſed to negative: hence a poſitive quantity, in algebra, is a real or affirmative quantity, or a quantity greater than nothing; thus called, in oppoſition to a privative or negative quantity, which is leſs than nothing, and marked by this ſign —. Poſitive quantities are deſigned by this character + prefixed or ſuppoſed to be prefixed to them. See the articles Negative, Quantity, and Character.

Positive, is alſo uſed in oppoſition to relative or arbitrary: thus we ſay, beauty is no poſitive thing but depends on the different taſtes of people. See the article Relative.

Positive Degree, in grammar, is the adjective in its ſimple ſignification, without any compariſon; or it is that termination of the adjective, which expreſſes itſelf ſimply, and abſolutely, without comparing it with any other: thus, *durus*, hard, *mollis*, ſoft, &c. are in the poſitive degree: but *durior*, harder, and *mollior*, ſofter, &c. in the comparative degree; and *duriſſimus*, hardeſt, and *molliſſimus*, ſofteſt, &c. in the ſuperlative degree. See the articles Comparative and Superlative.

Positive, in muſic, denotes the little organ uſually placed behind or at the feet of an organiſt, played with the ſame wind and the ſame bellows, and conſiſting of the ſame number of pipes with the larger one, though thoſe much ſmaller, and in a certain proportion: this is properly the choir-organ.

POSSE Comitatus, in law, ſignifies the power of the county, or the aid and aſſiſtance of all the knights, gentlemen, yeomen, labourers, ſervants, apprentices, &c. and all others within the county that are above the age of fifteen, except women, eccleſiaſtical perſons, and ſuch as are decrepit and infirm.

POSSESSION, in law, the holding or occupying of any thing, either de jure or de facto.

Poſſeſſion de jure, is the title a man has to enjoy a thing, though it be uſurped and in the actual poſſeſſion of another; or where lands are deſcended to a perſon, and he has not yet entered into them: and poſſeſſion de facto, or actual poſſeſſion, is where there is an actual or effectual enjoyment of a thing.

POSSESSIVE, in grammar, a term applied to pronouns which denote the enjoyment or poſſeſſion of any thing, either in particular or in common: as *meus*, mine, and *tuus*, thine; *noſter*, ours, and *veſter*, yours. See the article Pronoun.

POSSIBILITY, *Poſſibilitas*, in law, is defined to be any thing that is altogether uncertain, or what may or may not be, and is taken to be either near or remote.

A near poſſibility, is where an eſtate is limited to one after another's deceaſe, whilſt a remote poſſibility is ſomething extraordinary, that is never likely to come to paſs.

POSSIBLE, *Poſſibile*, is ſometimes oppoſed to real exiſtence, and underſtood of a thing which, though it does not actually exiſt, yet may exiſt; as a new ſtar, another world, &c. which are particularly ſaid to be phyſically poſſible.

It is alſo oppoſed to impoſſible, in which ſenſe it is applicable to any thing that does not contradict itſelf, or involve contradictory predicates, whether it actually exiſt or not, as a man, fire, &c. theſe are alſo ſaid to be logically poſſible.

POST, a courier or letter-carrier, or one who frequently changes horſes, poſted or placed on the road, for quicker diſpatch.

The word is alſo applied to the houſes where ſuch a perſon takes up and lays down his charge.

Penny-Post, a poſt eſtabliſhed for the benefit of London and the adjacent parts; by which any letter or parcel not exceeding ſixteen ounces weight, or ten pounds value, is ſpeedily conveyed to and from all parts within ten miles of London.

Post, in the military art, is any place or ſpot of ground fortified or not, where a body of men may make a ſtand and fortify themſelves, or remain in a condition to fight an enemy. Hence it is ſaid, that the poſt was relieved, the poſt was taken ſword in hand, &c.

Advanced Post, is a ſpot of ground ſeized by a party to ſecure the army, and cover the poſts that are behind..

Posts, in building, large pieces of timber placed upright in houſes. The poſts framed into breſſummers for ſtrengthening the carcaſe of a houſe, are called prick-poſts, and the corner poſts are called the principal poſts.

Burning a little the ends of the poſts that are to be ſet into the ground, is ſaid to be an excellent method to prevent them from rotting.

Posts, in ſculpture, are ornaments formed after the manner of rolls or wreathings; ſome of which are ſimple, and others enriched or flouriſhed.

POSTERIOR, a term of relation implying ſomething behind, or that comes after another, in which ſenſe it is uſed in oppoſition to prior and anterior.

POSTERN, in general, is a ſmall gate generally made in the angle of the flank of a baſtion, or in that of the curtin, or near the orillon, deſcending into the ditch; by which the garriſon may march in and out unperceived by the enemy, either to relieve the works, or to make private ſallies, &c.

POSTHUMOUS, a child born after the death of his father, or taken out of the body of a dead mother, from whence it is frequently applied to the works of an author not publiſhed till after his deceaſe.

POSTIL, a name anciently given to a note in the margin of the Bible, and afterwards to one in any other book poſterior to the text.

POSTING, among merchants, the putting an account forward from one book to another, particularly from the journal or waſte-book to the ledger. See the article Book.

POSTIQUE, in architecture, an ornament of ſculpture ſuperadded after the work is done. A table of marble, or other matter, is alſo ſaid to be poſtique, when it is incruſtated in a decoration of architecture, &c.

POSTPONING, putting any thing after or behind another, with regard to time.

POSTSCRIPT, an article added to a letter or memoir, containing ſomething learnt or recollected after the piece was written.

POSTULATE, *Poſtulatum*, in mathematics, &c. is deſcribed to be ſuch an eaſy, and ſelf-evident ſuppoſition, as needs no explication or illuſtration to render it intelligible; as, that a right-line may be drawn from one point to another. That a circle may be deſcribed on any center given, of any magnitude, &c. however, authors are not well agreed as to the ſignification of the term poſtulatum; ſome make the difference between axioms and poſtulata to be the ſame as that between the theorems and the problems; axioms, according to thoſe authors, being indemonſtrable theoretical truths. But others will have it, that axioms are primitive and common to all things, partaking of the nature of quantity, and which therefore may become the objects of mathematical ſcience; ſuch as number, time, extenſion, weight, motion, &c. and that poſtulata relate particularly to magnitudes, ſtrictly ſo called, as to things having local extenſion, ſuch as lines, ſurfaces, and ſolids; ſo that, in this ſenſe of the word poſtulatum, Euclid, beſides axioms, or thoſe principles which are common to all kinds of quantities, has aſſumed certain poſtulata to be granted him peculiar to extenſive magnitude. Hence ſeveral of the principles aſſumed in his elements, and ranked among the axioms by the moderns, are by Proclus ranked among the poſtulata, which has induced Dr. Wallis to judge, that the laſt of the two ſenſes given to the term poſtulatum is moſt agreeable to the meaning of the ancient geometers.

POSTURE, in painting and ſculpture, the ſituation of a figure with regard to the eye, and of the ſeveral principal members thereof with regard to one another, whereby its action is expreſſed.

POTABLE, *Potabilis*, ſomething that may be ſwallowed by way of drink.

POTAMOGETON, pond-weed, in botany, a genus of plants, whoſe flower conſiſts of four roundiſh, obtuſe, concave, patent, and unguiculated petals, with four obtuſe filaments topped with twin antheræ: there is no pericarpium; the ſeeds are four in number, roundiſh and acuminated, gibbous on one ſide, and compreſſed and angulated on the other..

This plant has a refrigerating virtue, and is recommended in the cure of old ulcers.

POT-Ash, the lixivious aſhes of certain vegetables uſed in the making of glaſs, ſoap, &c. See the articles Glass, Soap, &c.

POTATOE, in botany, the Engliſh name for a ſpecies of the tuberoſe-rooted ſolanum. See the article Solanum.

Culture of Potatoes.—Theſe roots being become a very common food among us, it may not be improper to mention their propagation and management: they may be encreaſed from ſeeds, but this is uncertain, as they are rarely perfect, and are more readily propagated by their roots, which multiply very faſt if planted in a proper ſoil; therefore there is no neceſſity for practiſing any other method. The latter end of March is the ſeaſon for planting them; the common way is either to plant the ſmall roots entire, or to cut the large roots in pieces, leaving an eye or two to each piece; this method is very well in the contracted diſtance the gardeners commonly plant them, which is not above a foot aſunder; but if the roots are choſen large and fair, without cutting, and planted at the diſtance of a foot and a half in the rows, and two feet and a half row from row, they will have room to extend their fibres, which will produce a greater quantity of roots, and larger, on the ſame ſpace of ground, than in the common method: the depth they ſhould be planted is about ſeven inches, but it is a wrong practice to plant them with a dibber, as it leaves a cavity underneath the plant; therefore they are beſt planted after the plough in the furrows, or where the ſpade is uſed, in the trenches.

When the plants are come up, the earth ſhould be well ſtirred with a hoe, which will deſtroy the weeds, and let in the rains and dews more readily, which is of ſingular ſervice to the plants, and being repeated a ſecond time, will be all that is neceſſary, as the ſtalks will cover the ground and keep down the growth of weeds, whereby it will be rendered clean for any ſucceeding crop.

In autumn the haulm ſhould be mowed down, and the roots taken up ſoon after and laid in a ſheltered place, which the froſt cannot eaſily penetrate, where they may be kept for uſe.

The ſoil in which potatoes thrive beſt is a light ſandy loam, not too dry or too moiſt, which ſhould be well wrought before planting, and a good quantity of rotten dung intermixed with it, which will make them grow luxuriantly.

POTENT, or Potence, a term for a kind of a croſs, whoſe ends all terminate like the head of a crutch. It is otherwiſe called the Jeruſalem croſs.

POTENTIAL in grammar, an epithet applied to one of the moods of verbs.

The potential is the ſame in form with the ſubjunctive, and is, according to Ruddiman, implied in that mood, for which reaſon that grammarian rejects it: but others will have it to differ from the ſubjunctive in this, that it always implies in it either *poſſum*, *volo*, or *debeo*.

It is ſometimes called the permiſſive mood, becauſe it often implies a permiſſion or conceſſion to do a thing. See the articles Mood and Subjunctive.

POTENTILLA, cinquefoil, in botany, a genus of plants, whoſe flower conſiſts of five roundiſh patent petals, inſerted by their ungues into a monophyllous cup: the ſtamina are twenty ſubulated filaments, topped with long moon-ſhaped antheræ: there is no pericarpium; the receptacle of the ſeeds is roundiſh, ſmall, and permanent, and is included in the cup, and ſurrounded with the ſeeds, which are numerous and acuminated.

The common cinquefoil, which grows naturally in many parts of England, is accounted balſamic, vulnerary, and aſtringent; and has been given in all ſorts of hæmorrhages, as well as in all kinds of fluxes of the belly; and is ſaid to poſſeſs in a great meaſure the virtues of the Peruvian bark, whence the expreſſed juice of it is of great uſe in intermittent fevers.

POTERIUM, garden-burnet, in botany, a genus of plants, producing male and female flowers on the ſame ſpike; the corolla of the male flower is formed of a ſingle petal, cut into four ovate, concave, patent ſegments, with a great number of capillary filaments, topped with roundiſh twin antheræ; the female flower is monopetalous and rotated: the fruit is a berry, the outer cruſt of which is formed of the indurate tube of the corolla, and contains two ſeeds.

This plant is propagated in gardens; the young tender leaves are put in ſallads, and are likewiſe uſed for cool tankards in hot weather; it is reckoned to be cordial and alexipharmic, and the powder of the root it recommended againſt ſpitting of blood.

POTHOS, in botany, a genus of plants, whoſe flower-cup is a globoſe ſpatha; the corolla conſiſts of four wedge-ſhaped, oblong, erect petals, having four broad erect filaments, topped with ſmall twin antheræ: the fruit is a roundiſh aggregate berry, with two cells, each containing one roundiſh ſeed.

POTION, *Potio*, a liquid medicine, conſiſting of as much as can be drank at one draught.

POTTERY, the manufacture of earthen-ware, or the art of making earthen veſſels.

Chineſe Pottery. See the article Porcelain.

POTTLE, an Engliſh meaſure containing two quarts. See the article Measure.

POULTICE, or Poultis, a form of medicine alſo called a cataplaſm. See the article Cataplasm.

POULTRY, all kinds of domeſtic birds brought up in yards, as cocks, hens, capons, ducks, turkeys, &c.

POUNCE, gum ſandaric pounded and ſifted very fine, to rub on paper, in order to preſerve it from ſinking, and to make it more fit to write upon.

Pounce, is alſo a little heap of charcoal-duſt, incloſed in a piece of muſlin or ſome other open ſtuff, to be paſſed over holes pricked in a work, in order to mark the lines or deſigns thereof on paper, ſilk, &c. placed underneath; which are to be afterwards finiſhed with a pen and ink, a needle, or the like. This kind of pounce is much uſed by embroiderers, to tranſfer their patterns upon ſtuffs; by lace-makers, and ſometimes alſo by engravers.

Pounces, in falconry, the talons or claws of a bird of prey. See the article Falconry.

POUND, *Libra*, a ſtandard-weight, for the proportion and ſubdiviſions of which, ſee the article WEIGHT.

POUND, alſo denotes a money of account; ſo called, becauſe the ancient pound of ſilver weighed a pound troy. See the article MONEY.

POUND, among lawyers, denotes a place of ſtrength, in which to keep cattle that are diſtrained, or put in for treſpaſs, until they are replevied or redeemed.

POUNDAGE, a ſubſidy of 12*d.* in the pound, granted to the crown on all goods and merchandizes exported or imported; and if by aliens, one penny more.

POURSUIVANT, or PURSUIVANT, in heraldry, the loweſt order of officers at arms.

POWDER, *Pulvis*, in pharmacy, a dry medicine well broken, either in a mortar, by grinding, or by chemical operations.

POWDERINGS, among builders, certain deviſes, ſerving to fill up vacant places in carved works.

POWER, *Potentia*, in phyſiology, the faculty of doing or ſuffering any thing.

POWER, in mechanics, denotes any force, whether of a man, a horſe, a ſpring, the wind, water, &c. which being applied to a machine, tends to produce motion. See the articles MACHINE and ENGINE.

The intenſity of a power is its abſolute force; that is, its force, ſuppoſing its velocity equal to its weight: for its moving or acting force may be greater or leſs, according as its velocity is increaſed or diminiſhed, in reſpect of that of the weight.

When we ſpeak of the mechanical powers, the word power is taken in a very different ſenſe from that above laid down; ſince, in this caſe, it ſignifies only an organ or inſtrument, whereby a power of a known intenſity is made to act upon a weight: and therefore we muſt take care not to attribute any real force to any ſimple or compound machine, as many are apt to do, merely becauſe the name power has been given to mechanical organs, not from their effect, but from the effect which the power produces by their means.

For how much ſoever the force of a power is thereby increaſed, in order to ſuſtain or raiſe a weight far ſuperior to it in intenſity; yet this cannot be done without loſing in ſpace and time what is gained in force; contrary to what ſome have vainly imagined, becauſe the vulgar commonly ſpeak of a machine as they do of an animal; attributing that effect to the machine, which is only the effect of the power by means of the machine: thus, it is uſual to ſay, ſuch a machine raiſes ſuch a quantity of water, or performs ſuch and ſuch work; when we ſhould ſay, if we would ſpeak philoſophically, ſuch a running ſtream, ſuch a fall of water, the wind, or ſo many men, horſes, oxen, &c. raiſe ſo much water in ſuch a time, &c. by means of ſuch or ſuch a machine. It were therefore to be wiſhed, that the word power were to be confined to its proper ſenſe, and not uſed to ſignify one of the mechanical organs; however, as it has been cuſtomary to uſe it in that ſenſe, we have done ſo too, but withal thought proper to give the preceding caution.

The ſimple mechanical organs or powers are the lever, balance, axis in peritrochio, pulley, ſcrew, wedge, and inclined-plane. See the articles LEVER, BALANCE, &c.

POWER, in law, ſignifies, in general, a particular authority, granted by any perſon to another to repreſent him, or act in his ſtead.

POWERS, in arithmetic and algebra, are nothing but the products ariſing from the continual multiplication of a number, or quantity, into itſelf: thus, 2, 4, 8, 16, 32, &c. are the powers of the number 2; and a, a^2, a^3, a^4, &c. the powers of the quantity a; which operation is called involution. See the articles INVOLUTION and BINOMIAL.

POX, or SMALL-POX, *Variolæ*, in medicine, a contagious diſeaſe appearing on the ſurface of the ſkin, which it covers with puſtules, or ulcerous eruptions, that frequently leave ſcars behind them.

French-POX, *Lues Venerea*, is defined a malignant and putredinous dyſcraſy of all the humours, but eſpecially of the ſerum and lympth, ariſing from a venereal taint received into the body; or, according to Sydenham, when a gonorrhœa has continued a long while, or long enough for the poiſonous matter to make its way into the blood; or by aſtringents given unſeaſonably, it cannot make its exit, then the patient is infected with the French pox. See the article GONORRHOEA.

The buboes in the groin conſtitute the firſt degree of this diſtemper: then follow pains of the head, joints, of the ſhoulders, arms, and ancles, coming on by fits, but at no certain intervals, unleſs in the night, when the patient is warm in bed. See the article BUBO.

There are alſo ſcabs and ſcurfs in various parts of the body, which are as yellow as a honey-comb; ſometimes they have large ſurfaces, anſwering the deſcription which authors give of the leproſy. All theſe ſymptoms gradually increaſe, eſpecially the pain, which becomes ſo intenſe that the patient is unable to lie in bed. Afterwards nodes or exoſtoſes ariſe in the ſkull, ſkin-bones, and bones of the arms, which being attended with conſtant pain and inflammation, at length grow carious and putrefied: phagedenic ulcers likewiſe ſeize various parts of the body, but generally begin with the throat, then gradually creep by the palate to the cartilage of the noſe, which they deſtroy, and the noſe being deſtitute of its prop, falls down flat. The ulcers and pains daily encreaſing, the patient ſinks under the torment, and one member rotting away after another, is hurried into his grave.

PRACTICE, in arithmetic, or rules of practice, are certain compendious ways of working the rule of proportion, or golden-rule. See Rule *of Three.*

PRÆ, a Latin prepoſition, literally ſignifying *before*, and uſed in many words in our language, to denote the relation of priority; though they are often written with the common *e* inſtead of the *æ*; as præceſſion or preceſſion, prædeceſſor or predeceſſor, &c.

PRASIUM, in botany, a genus of plants, whoſe flower is monopetalous and ringent, the upper lip is erect, roundiſh, and ſlightly emarginated; the lower lip is broad, trifid, and reflexed; the fruit conſiſts of four roundiſh unilocular berries, placed in the bottom of the cup, and containing ſolitary roundiſh ſeeds.

PRATIQUE, or Prattic, in commerce, a negotiation, or communication, of commerce, which a merchant-veſſel obtains in the port it arrives in, and the countries it diſcovers: hence to obtain a pratique, is to obtain a liberty to frequent a port, to go aſhore, to buy and ſell, &c.

Pratique is particularly uſed for a licence to traffic, granted to the maſter of a ſhip in the ports of Italy upon a bill of health; that is, a certificate that the place whence he came is not annoyed with any infectious diſeaſe.

PRAYER, in theology, a petition put up to God, either for the obtaining ſome future favour, or the returning of thanks for a paſt one.

PREACHING, in theology, the promulgation of the word of God in public; or the making a ſermon, or public oration, on ſome paſſage in the ſacred Scriptures, in order to inform the judgment, and mend the lives of the hearers.

PREADAMITE, a denomination given to the inhabitants of the earth who, according to ſome people, lived before Adam.

PREAMBLE, in law, the beginning of an act of parliament, &c. which ſerves to open the intent of the act, and the miſchiefs intended to be remedied by it.

PREBEND, the maintenance a prebendary receives out of the eſtate of a cathedral or collegiate church. Prebends are diſtinguiſhed into ſimple and dignitary; a ſimple prebend has no more than the revenue for its ſupport; but a prebend with dignitary, has always a juriſdiction annexed to it.

BREBENDARY, an eccleſiaſtic who enjoys a prebend.

The difference between a prebendary and a canon is, that the former receives his prebend, in conſideration of his officiating in the church; but the latter merely by his being received into the cathedral or college.

PRECEDENT, in law, a caſe which has been determined, and which ſerves as a rule for all of the ſame nature: thus the precedents of a court have the force of laws, and no court will reverſe a judgment contrary to many precedents.

PRECENTOR, a dignitary in cathedrals, popularly called the chantor, or maſter of the choir.

PRECEPT, in law, a command in writing ſent by a chief juſtice, juſtice of the peace, &c. for bringing a perſon, record, or other matter, before him.

Precept is alſo uſed for the command or incitement by which one man ſtirs up another to commit felony, theft, &c.

PRECESSION, *Præceſſio*, in aſtronomy, a term applied to a ſlow motion of the equinoctial points towards the weſt; that is, in the language of aſtronomers, *in antecedentia*, or contrary to the order of the ſigns. See Sign.

This motion of the equinoctial points is occaſioned by the poles of the world revolving round thoſe of the ecliptic: in order to illuſtrate which, let D C H (plate LXXIII. *fig.* 13.) be the part of the earth's orbit, C its center, E C the axis of the ecliptic, E its pole, C P the axis of the earth, P its pole; through the points E and P draw the great circle E P A, meeting the ecliptic A L in A; the arch P A is equal to the inclination of the axis of the earth to the plane of the ecliptic, viz. the angle P C H, which is found by obſervation to be about 66° 30′, and therefore its complemental arch E P, or angle $PCE = 23° 30'$.

Through the pole P, from the point E, deſcribe a leſſer circle P F G, which will be parallel to the ecliptic; then, if the axis of the earth be directed at any particular time to P, it is found by obſervation of many years, that it will not be conſtantly directed to the point P, but in ſeventy-two years time be directed to ſome other point Q, ſo that the arch $PQ = 1$ degree; and therefore, in the ſpace of $360 \times 72 = 25920$ years, the point P, or pole of the world, will deſcribe the circle P F G, about the pole of the ecliptic E, which revolution is called *annus magnus*, the great year; after which, the ſtars being re-inſtated in their proper places, the ancients imagined there would be a total renovation of all things.

The cauſe of this conical motion of the earth's axis was unknown to all the aſtronomers before Sir Iſaac Newton's time, none of them being able to gueſs from whence it could proceed; but this ſublime geometer ſoon inveſtigated its cauſe, and demonſtrated that it reſults from the laws of motion and gravity, that is, from the ſpheroidical figure of the earth; for if the earth was a perfect ſphere, its axis would always continue parallel to itſelf, and conſequently have no ſuch motion. Hence the reaſon of the proceſſion of the equinoctial points may be eaſily conceived; for the circle E P A, paſſing through both the pole of the ecliptic and equator, will be the ſolſtitial colure, and A the ſolſtitial point, when the axis of the earth points to P; but after ſeventy-two years, when it points to Q, then the great circle EQB will be the ſolſtitial colure, and B the ſolſtice. And becauſe the equinoctial points are always ninety degrees diſtant from the ſolſtices, they muſt conſequently move in the ſame time, through the ſame arch, and the ſame way, viz. weſtward, or in antecedentia.

This retrograde motion, by carrying the equinoctial points to meet the ſun in his apparent annual motion, makes him arrive at them ſooner every year than he would do if thoſe points continued immoveable: and this arch of regreſſion being $50''$ a year, or one degree in ſeventy-two years, makes the equinoxes happen 20 in time ſooner each year than they would otherwiſe do. And though this change be not ſenſible in a few years, yet theſe points are found to have a very different ſituation from what they had two thouſand years ago.

By reaſon of this preceſſion of the equinoctial points, the fixed ſtars ſeem to move towards the eaſt, and thereby to have their longitude, which is always reckoned upon the ecliptic, from the vernal equinoctial point, encreaſed: and hence the conſtellations ſeem to have deſerted the places allotted them by the antient aſtronomers; for inſtance, the beginning of the ſign aries, which in Hipparchus's time, was near the vernal equinoctial point, and gave name to that point of the ecliptic, is now removed near a whole ſign, or thirty degrees, eaſtward; ſo that aries is now where taurus uſed to be, taurus where gemini uſed to be, &c. and thus all the conſtellations of the zodiac have changed their antient places; but to avoid confuſion, aſtronomers have thought fit to let the ſeveral portions of the ecliptic, where theſe conſtellations were at firſt obſerved to be, retain their old names; ſo that the vernal equinoctial point is ſtill reckoned the firſt degree of aries. However, theſe portions of the ecliptic, where the conſtellations were at firſt, are called *anaſtra*, to diſtinguiſh them from the places where they now are, which are termed *ſtellata*.

PRECIPITANT, *Præcipitans*, in chemiſtry, is applied to any liquor, which, when poured on a ſolution, ſeparates what is diſſolved, and makes it precipitate, or fall to the bottom of the veſſel.

PRECIPITATE, *Præcipitatus*, in chemiſtry, a ſubſtance which having been diſſolved in a proper menſtruum, is again ſeparated from its ſolvent, and thrown down to the bottom of the veſſel, by pouring ſome other liquor upon it.

PRECIPITATION, *Precipitatio*, a proceſs in chemiſtry, which is a kind of ſeparation, whereby the particles of a body diſſolved and ſuſpended in any menſtruus liquor, are detached therefrom, and fall down to the bottom of the veſſel. Theſe particles ſometimes precipitate of their own accord, but oftener by the aſſiſtance of ſome other liquor added to the menſtruum. So that precipitation is the ſeparating ſolid bodies from any fluid menſtruum, wherein they are diſſolved, by the addition of a third body, which, counteracting the power of the menſtruum, cauſes that which was diſſolved to regain its ſolid form, and ſubſide in the ſtate of a powder.

PRECONTRACT, in law, properly ſignifies a contract made before another, but is chiefly applied to marriage-contracts.

PRECORDIA, *Præcordia*, in anatomy, a general name to the parts ſituated about the heart, in the fore-part of the thorax; as the diaphragm, pericardium, and even the heart itſelf, with the ſpleen, lungs, &c.

PREDESTINATION, in general, ſignifies a decree of God, whereby, from all eternity, he ordained ſuch a concatination of cauſes as muſt produce every event by a kind of fatal neceſſity, and maugre all oppoſition. See the articles FATE, NECESSITY, &c.

Nothing has occaſioned more diſputes than this thorny ſubject of predeſtination; the Lutherans ſpeak of it with horror, whilſt the Calviniſts contend for it with great zeal; the Moliniſts and Jeſuits preach it down as a moſt dangerous doctrine, whilſt the Janſeniſts aſſert it as an article of faith; the Arminians, Remonſtrants, and Pelagians, are all avowed enemies to predeſtination.

PREDETERMINATION, in philoſophy, that concurrence of God, which determines men in all their actions, both good and evil; and this concurrence, or influence, is called phyſical predetermination, or premotion: for divines maintain, that God has no ſhare in the ſins of mankind, inaſmuch as he only affords his concurrence to the phyſical part of their actions, not to the moral part.

PREDIAL TITHES, are thoſe that are paid of things ariſing and growing from the ground only; as corn, hay, fruit, &c. See the article TITHES.

PREDICABLE, among logicians, denotes a general quality which may be predicated, or aſſerted of ſeveral things: thus animal is predicable of mankind, beaſts, birds, fiſhes, &c.

PREDICAMENT, among logicians, the ſame with category. See CATEGORY.

PREDICATE, *Prædicatum*, in logic, that part of a propoſition which affirms or denies ſomething of the ſubject: thus, in theſe propoſitions, *ſnow is white*, *ink is not white*, whiteneſs is the predicate which is affirmed of ſnow, and denied of ink.

PREDICATING, in logic, the act of affirming or denying ſomething of a thing, as a man is not an angel; body is a ſubſtance, &c.

PREDICTION, *Prædictio*, the foretelling of what is to come, either by divine revelation, art, or conjecture.

PREDOMINANT, *Prædominans*, that which prevails, or has ſome ſuperiority, over another thing.

PREENING, in natural hiſtory, the action of birds dreſſing their feathers, to enable them to glide the more readily through the air, &c.

PRE-EXISTENCE, *Præ-exiſtentia*, the ſtate of a thing actually in being before another.

PREFACE, *Præfatio*, ſomething introductory to a book, to inform the reader of the deſign, method, &c. obſerved therein; and generally whatever is neceſſary to facilitate the underſtanding of a book.

PREFECT, *Præfectus*, in ancient Rome, one of the chief magiſtrates, who governed in the abſence of the kings, conſuls, and emperors.

PREGNANCY, *Graviditas*, the ſtate of a woman who has conceived, or is with child. See the articles GENERATION, CONCEPTION, &c.

PREJUDICE, *Præjudicium*, does not mean a judgment merely as prior to another in reſpect of time, but as being paſſed before the things were duly conſidered and fully underſtood. Hence prejudice is ſometimes called anticipation, and a preconceived opinion; and makes one of the many cauſes of error. See ERROR.

PRELATE, an eccleſiaſtic raiſed to ſome eminent and ſuperior dignity in the church; as biſhops, archbiſhops, patriarchs, &c. See BISHOP, &c.

PRELIMINARY, in general, denotes ſomething to be examined and determined, before an affair can be treated of to the purpoſe.

PRELUDE, *Præludium*, in muſic, is uſually a flouriſh or irregular air, which a muſician plays off-hand, to try if his inſtrument be in tune, and ſo lead him into the piece to be played. Very often the whole band in the orcheſtra run a few diviſions, to give the tune.

PREMISES, or PREMISSES, *Præmiſſæ*, in logic, an appellation given to the two firſt propoſitions of a ſyllogiſm, as going before, or preceding the concluſion.

PREMISES, in law, properly ſignifies the land, &c. mentioned in the beginning of a deed. See the article DEED.

PREMIUM, or PRÆMIUM, properly ſignifies a reward or recompence; but it is chiefly uſed in a mercantile ſenſe for the ſum of money given to an inſurer, whether of ſhips, houſes, lives, &c.

PREMONSTRATENSES, in church-hiſtory, a religious order, inſtituted by St. Norbert, about the year 1119.

PREMOTION, *Præmotio*, the ſame with predetermination. See the article PREDETERMINATION.

PREMUNIRE, or PRÆMUNIRE, in law, is taken two ways; either for a writ, or for the offence for which it is granted.

Formerly the church of Rome carried its pretended right of ſupremacy to ſuch a height, that ſeveral ſtatutes were made to check and reſtrain the growing power of the pope; but more eſpecially ſtat. 16 Richard II. c. 5. commonly known by the name of the ſtatute of premunire, which ordains the puniſhment of offenders on this ſtatute to be this; that they ſhould be out of the king's protection, attached by their bodies, i. e. impriſoned at the king's pleaſure, and loſe their lands, goods, and chattels.

Premunire is now chiefly uſed for the above puniſhment, which is incurred not only by thoſe who aſſert the pope's ſupremacy; but alſo by thoſe who refuſe to take the oath of allegiance, or of the king's ſupremacy, &c.

PRENANTHES, in botany, a genus of plants, the compound flower of which is not imbricated, but conſiſts of five or eight equal hermaphrodite florets, placed in a ſimple round order; theſe are monopetalous, ligulated, and quadritentated, and are ſucceeded by ſolitary heart-ſhaped ſeeds, crowned with hairy down, and contained in the cup.

PRENOMEN, *Prænomen*, among the antient Romans, a name prefixed to their family-name, anſwering to our chriſtian name: ſuch are Caius, Lucius, Marcus.

PREPARATION, *Præparatio*, in mathematics, ſomething preparatory to the demonſtration of a propoſition. Thus if a propoſition in geometry is to be demonſtrated, the preparation conſiſts in drawing certain lines; and if a propoſition in arithmetic, in ſome computation to be previouſly made to come at the demonſtration.

PREPARATION, in pharmacy, &c. the manner of preparing and managing any medicine, in order to fit it to ſerve the purpoſes for which it is intended.

PREPARATION, in anatomy, the art of preſerving the parts of animals for anatomical uſes; which is done either by drying them thoroughly, or putting them in a proper liquor.

PREPENSED, *Præpenſus*, in law, denotes forethought: thus when a man is ſlain upon a ſudden quarrel, if there was malice prepenſed formerly between them, it makes it murder.

PREPOSITION, *Præpoſitio*, in grammar, one of the parts of ſpeech, being an indeclinable particle which yet ſerves to govern the nouns that follow it; ſuch as *per*, *pro*, *propter*; and through, for, with, &c.

F. Buffier allows it to be only a modificative of a part of ſpeech, ſerving to circumſtantiate a noun.

PREPUCE, *Præputium*, in anatomy, the foreſkin; being a prolongation of the cutis of the penis, covering the glans.

PREROGATIVE, *Prærogativa*, a pre-eminence which one perſon has over another.

PRESAGE, *Præſagium*, in antiquity, denotes an augury, or ſign of ſome future event; which was chiefly taken from the flight of birds, the entrails of victims, &c.

Among phyſicians, the term preſage is ſometimes uſed for prognoſtic ſign.

PRESBYTA, πρεσβυτης, in optics, a perſon whoſe eyes being flat, can ſee diſtant objects diſtinctly, but thoſe near, confuſedly; which defect of ſight got this appellation, becauſe old people are naturally ſubject to it.

Spectacles, or convex-glaſſes, are the only remedy for this defect; for if theſe are well fitted to the degree of flatneſs of the eyes, they cauſe the rays of light to converge in ſuch a manner from near objects, as to make them fall exactly on the retina, and thereby produce diſtinct viſion.

PRESBYTER, in the primitive chriſtian church, an elder, one of the ſecond order of eccleſiaſtics; the other two being biſhops and deacons.

Preſbyter, or elder, is a word borrowed from the Greek tranſlation of the Old-Teſtament, where it commonly ſignifies ruler or governor; it being a note of office and dignity, not of age; and in this ſenſe, biſhops are ſometimes called preſbyters in the New-Teſtament.

PRESBYTERIANS, a ſect of proteſtants, ſo called from their maintaining that the goverment of the church, appointed in the New-Teſtament, was by preſbyteries; that is, by miniſters and ruling elders, aſſociated for its government and diſcipline.

The preſbyterians affirm, that there is no order in the church, as eſtabliſhed by Chriſt and his apoſtles, ſuperior to that of preſbyters; that all miniſters being ambaſſadors of Chriſt, are equal by their commiſſion; and that elder or preſbyter, and biſhop, are the ſame in name and office: for which they alledge, *Acts* xx. 28, &c.

The only difference between them and the church of England, relates to diſcipline and church-government.

PRESCIENCE, in theology, fore-knowledge, or the knowledge which God has of events before they come to paſs.

PRESCRIPTION, in law, is a right or title acquired by uſe and time, introduced for aſſuring the property of effects, in favour of perſons who have for a certain time had them in their poſſeſſion.

PRESCRIPTION, in medicine, is the aſſigning a proper and adequate remedy to a diſeaſe, from an examination of its ſymptoms, and an acquaintance with the virtues and effects of the materia medica.

PRESENT, *Præſens*, in grammar, the firſt tenſe of a verb, expreſſing the preſent time, or that ſomething is now performing; as *ſcribo*, I write, or am writing. See the article TENSE.

PRESENTATION, in law, the act of a patron offering his clerk to be inſtituted in a benefice of his gift, the ſame being void.

PRESENTÉE, the clerk preſented to a benefice by the patron.

PRESENTMENT, in law, a denunciation of jurors, or a juſtice of the peace, or other officers, without any information of an offence inquirable by the court, to which it is preſented; or it may be ſaid to be an information made by the jury in a court before a judge, who has authority to puniſh any offence committed contrary to law; and it is what the grand jury finds and preſents to the court, without any bill of indictment delivered: yet it is afterwards reduced into the form of an indictment.

PRESEPE, or PRÆSEPE, in aſtronomy, the name given to three nebulous ſtars in the breaſt of Cancer. See the article CANCER.

PRESERVATION, in general, denotes the art of preſerving things in a ſtate of perfection; or, at leaſt, from being ſo far corrupted and ſpoiled, as to be no longer uſeful.

Animal ſubſtances are preſerved by curing, pickling, drying, or chemical preparation. See the articles CURING, PICKLING, &c.

For the method of preſerving corn in granaries, ſee the articles CORN and GRANARY.

Fruits may be long preſerved in ſpirit of wine, firſt well ſaturated with the ſkins and tinging parts of thoſe fruits; and many may be tolerably preſerved in perfectly fermented liquors, which generate no more air.

The more ſolid vegetable ſubſtances may be preſerved by gently drying in the ſun, ſhade, or other ſlack heat. Thus peas or beans may be dried young in a ſlack oven in their proper ſeaſon, and may afterwards be boiled in the winter, and will eat young and tender, as if juſt gathered.

The ways of preſerving fruits, both dry and moiſt, with ſugar, are now univerſally known; and there are, in the ſeveral ways, many ſecrets, in the hands of particular artiſts, which it would be well to have generally known. See the article FRUIT.

As for the methods of curing and preſerving vegetable juices and liquors, by decoction, inſpiſſation, fermentation, clarification, matching, &c. See the articles DECOCTION, INSPISSATION, &c.

PRESERVATIVE, among phyſicians, denotes a medicine taken by way of precaution; or, to ſecure a man from a diſeaſe that threatens him.

The principal preſervatives, according to Boerhaave, are abſtinence, quiet, drinking warm water; and, after this, a gentle and continued motion till the firſt appearance of ſweat; then a profound ſleep, the body being well covered.

In the time of a plague, preſervatives are very neceſſary againſt the contagion of the air.

Generous wines, cardiacs, and ſudorifics, are alſo powerful preſervatives.

PRESIDENT, *Præſes*, an officer created or elected to preſide over a company, in contradiſtinction to the other members, who are called reſidents.

PRESS, *Prelum*, in the mechanic arts, a machine of wood, or iron, ſerving to ſqueeze any body very cloſe.

Thus, let A B (plate LXXV. *fig.* 1.) be a cheeſe-preſs; where C E, F G, are levers, moveable

able about the points, D, E, F, G, by applying the hand at C; S, the ſtone, or weight; and H, the cheeſe to be preſſed.

Now, if $CD = 5$, $DE = 2$, $FG = 6$, $GH = 2$, $FR = 1$, $FH = 4$; then in the lever C E, D is the fulcrum. Call the power at C, 1; then the force at E or F is $\frac{5}{2}$. And in the lever F G, whoſe fulcrum is G, if the power at F be 1, the force at R is $\frac{6}{5}$; and therefore the power at C is to the weight S, as 1 to $\frac{5}{2} \times \frac{6}{5}$, or 3. Alſo the weight of the ſtone at R is to the preſſure at H, as 2 to 5, or 1 to $\frac{5}{2}$; and the power at C is to the preſſure at H, as 1 to $3 \times \frac{5}{2}$, or $7\frac{1}{2}$.

Preſſes uſually conſiſt of ſix pieces; two flat ſmooth planks, between which the things to be preſſed are laid; two ſcrews or worms faſtened to the lower plank, and paſſing through two holes in the upper; and two nuts in form of an S, that ſerve to drive the upper plank, which is moveable, againſt the lower, which is fixed.

Preſſes uſed for expreſſing liquors are, in moſt reſpects, the ſame with the common preſſes, only the under plank is perforated with a great number of holes for the juice to run through. Others have only one ſcrew, or arbor, paſſing through the middle of the moveable plank, which deſcends into a kind of ſquare box, full of holes, through which the juices flow, as the arbor is turned.

But that the reader may be enabled to form a more diſtinct idea of theſe preſſes, we ſhall give a draught of the common and great wine-preſs, uſed for ſqueezing the juice out of grapes.

A B (plate LXXV. *fig.* 2.) is the baſe or pedeſtal and other ſupporters of the common wine-preſs. C, C, the cheeks, which are upright beams, the lower extremities of which are ſunk in the earth, where they are ſtrongly fixed by croſs bars and maſonry: they are traverſed at top by two beams, the lowermoſt of which is the nut, or receptacle of the ſcrew. D is the ſcrew with its wheel. E the bearer, or large piece of timber on which the wheels reſt, in order to ſink the beams croſſing the planks that cover the grapes, F. G, G, the maye, or planks on which the grapes are diſpoſed, in order to be ſqueezed: theſe planks are cut in notches, to receive the liquor and convey it to a veſſel appropriated to receive it. The maye is ſupported on a maſſive work of maſonry. H is the wheel that ſerves to force down the ſcrew and bearer upon the grapes, which are laid upon the maye in a ſquare heap: this it does by winding off the cord from the wheel of the ſcrew D, by which means the ſcrew and the bearer, E, are preſſed down upon the grapes, which are uſually covered with croſs-beams, reared above each other. I is a leather pipe, terminating in two wooden tubes, for conveying the wine from one piece to another. K is a large bellows to agitate the wine when it has ſettled into an even ſurface in both veſſels. L the ſame bellows in profile. M is a large fountain, which affords a quick flow. And N is a ſtopple to cloſe the veſſel newly filled, and prevent the wine from running over, upon withdrawing the wooden tube.

A B (*fig.* 3.) repreſents the baſe and other ſupports of the great wine-preſs; C, C, &c. the cheeks or ſide-beams; D, D, great beams, two in number at leaſt, and frequently four, or even ſix; E the ſcrew; F the nut of the preſs; G the wheel, which by the help of five or ſix men, turns the ſcrew; and H the cage, which is an aſſemblage of ſeveral ſtrong pieces of timber formed into a ſquare, and lined with maſonry within. This cage is ten feet long, and four and a half broad on each ſide, and may be either raiſed out of, or ſunk into, the pit of maſonwork I; from whence it is exhibited as aſcending in the figure referred. It uſually weighs three thouſand pounds; and being ſuſpended in the manner repreſented, forms, in conjunction with the ſcrew, a lever of an immenſe force, for ſqueezing down a bearer upon grapes placed upon the maye K, as in the former figure. See the article WINE.

As to cyder-preſſes, the beſt and leaſt chargeable is that called the box-preſs (*fig.* 4.) with which you may ſqueeze apples, pears, grapes, or any other fruit to make cyder, perry, wine, or verjuice: for, as one end of the box terminates in a moveable beam, which is worked by a wheel and a ſcrew in the uſual manner; ſo there are holes in the ſide of the box, through which the juice flows, by a ſpout, into a veſſel deſigned to receive it. See the article CYDER.

PRESSURE, or PRESSION, in general, denotes the ſqeezing a thing cloſe together.

PREST, a duty in money paid by the ſheriff upon his account in the exchequer, for money remaining in his hands.

PREST-MONEY, the money given to new 'liſted ſoldiers, ſo called becauſe it binds thoſe who receive it, to be ready at all times.

PRESTATION, ſignifies the payment of a certain ſum by archdeacons, and other clergymen, annually to their biſhop.

PRESTER, in phyſiology, a meteor conſiſting of an exhalation, thrown from the clouds downwards with ſuch violence, as by the colliſion it is ſet on fire.

It differs from the thunderbolt in the manner of its inflammation, and its burning and breaking every thing it touches with great vehemence.

PRESUMPTION, in law, ſignifies an opinion or belief of a thing.

PRESUMPTIVE HEIR, the ſame with heir at law. See the article HEIR.

PRETENCE, or *Eſcutcheon of* PRETENCE, in heraldry. See the article ESCUTCHEON.

PRETERITE, *Præteritum*, in grammar, a tenſe which expreſſes the time paſt, or an action completely finiſhed; as *ſcripſi*, I have wrote, &c.

PRETERITION, in rhetoric, a figure whereby, in pretending to paſs over a thing untouched, we take a ſummery veiw of it.

PRETEXT, a colour or motive, whether real or feigned, for doing ſomething.

PRETOR, or PRÆTOR, a magiſtrate among the ancient Romans, not unlike our lord chief juſtices, or lord-chancellor, or both in one; as being veſted with the power of diſtributing juſtice among the citizens.

PRETORIAN GUARDS, *Prætoriæ Cohortæ*, in Roman antiquity, were the emperor's guards, who at length were increaſed to ten thouſand; according to ſome, they had this denomination from their being ſtationed at a place in the palace called Pretorium: their commander was ſtiled præfectus prætorii.

PREVARICATION, *Prævaricatio*, in the civil law, is where the informer colludes with the defendants, and ſo makes only a ſham proſecution.

PREVARICATION, in our laws, is when a man falſely ſeems to undertake a thing, with intention that he may deſtroy it; where a lawyer pleads booty, or acts by colluſion, &c.

PREVARICATOR, *Prævaricator*, at Cambridge, is a maſter of arts, choſen at a commencement, to make an ingenious ſatirical ſpeech, reflecting on the miſdemeanors of the principal members.

PREVENTION, *Præventio*, in the canon-law, &c. the right which a ſuperior perſon has to claim or tranſact an affair, prior to an inferior one.

PRIAPISM, ϖριαπισμος, in medicine, a continual and painful erection of the penis.

PRIAPUS, in medicine, denotes the genital parts in men.

It alſo denotes, in antiquity, a fabulous deity, revered very much for the extraordinary ſize of his parts.

PRICKING, in the ſea language, is to make a point on the plat or chart, near about where the ſhip then is, or is to be at ſuch a time, in order to find the courſe they are to ſteer. See the articles NAVIGATION and SAILING.

PRIEST, *Sacerdos*, a perſon ſet apart for the performance of ſacrifice, and other offices of religion.

PRIEST, *Preſbyter*, in the chriſtian church, is a perſon inveſted with holy orders; in virtue whereof he has a power to preach, pray, adminiſter the ſacrament, &c. Alſo in the Romiſh church, to bleſs, abſolve, &c.

PRIMÆ VIÆ, among phyſicians, denotes the whole alimentary duct; including the oeſophagus, ſtomach, and inteſtines, with their appendages.

PRIMAGE, in commerce, a ſmall duty at the water-ſide, uſually about twelve-pence per tun, or ſix-pence a bale, due to the maſter and mariners of a ſhip; to the maſter for the uſe of ropes, &c. to diſcharge the goods; and to the mariners, for the loading or unloading of the veſſel.

PRIMARY-PLANET, in aſtronomy, one that revolves round the ſun as a center.

PRIMATE, *Primas*, in church-polity, an archbiſhop, who is inveſted with a juriſdiction over other biſhops.

PRIME, *Primus*, an appellation given to whatever is firſt in order, degree, or dignity, among ſeveral things of the ſame or like kind; thus we ſay, the prime miniſter, prime coſt, &c.

Prime is ſometimes uſed to denote the ſame with decimal, or the tenth part of an unit. See the article DECIMAL.

In weights, it ſtands for the twenty-fourth part of a grain. See WEIGHT and GRAIN.

PRIME *Figure*, in geometry, one which cannot be divided into any other figures more ſimple than itſelf, as a triangle among planes, and the pyramid among ſolids. See the article FIGURE.

For prime numbers, in arithmetic, ſee the article NUMBER.

PRIME *of the Moon*, is the new moon, when ſhe firſt appears, which is about three days after the change. See the article MOON.

PRIME VERTICAL, is that vertical circle which paſſes through the poles of the meridian, or the eaſt and weſt points of the horizon; whence dials projected on the plane of this circle, are called prime vertical, or north and ſouth dials. See the articles VERTICAL, DIAL, &c.

PRIME, in the Romiſh church, is the firſt of the canonical hours, ſucceeding to lauds.

PRIME, in fencing, is the firſt chief of the guards. See the article GUARD.

PRIMING, or PRIME *of a Gun*, is the gunpowder put into the pan or touch-hole of a piece, to give it fire thereby; and this is the laſt thing done in charging.

PRIMING, among painters, ſignifies the laying on of the firſt colours.

PRIMITIVE, in grammar, is a root or original word in a language, in contradiſtinction to derivative: thus, *God* is a primitive; *godly*, derivative; and *god-like*, a compound.

PRIMOGENITURE, *Primogenitura*, the right of firſt-born.

PRIMULA, the primroſe, in botany, a genus of plants, whoſe flower is monopetalous; the tube is cylindraceous; the length of the cup and the limb is expanded, and divided into five cordated ſegments: the ſtamina are five ſhort filaments, placed in the neck of the corolla, and terminated by erect acuminated antheræ: the fruit is an oblong capſule, opening at the top, and filled with roundiſh ſeeds.

This genus includes the auricula of Tournefort, and the polyanthus of the gardeners. See the articles AURICULA and POLYANTHUS.

The common primroſe grows almoſt every where, among fields, woods, and ſhady places; the flowers, leaves, and roots, are reckoned good in paralytic and arthritic complaints.

PRIMUM MOBILE, in the Ptolemaic ſyſtem of aſtronomy. See the article MOBILE.

PRINCE, *Princeps*, in polity, a perſon inveſted with the ſupreme command of a ſtate, independent of any ſuperior.

Prince alſo denotes a perſon who is a ſovereign in his own territories, yet holds of ſome other as his ſuperior.

PRINCE *of the Senate*, in old Rome, the perſon who was called over firſt in the roll of ſenators, whenever it was renewed by the cenſors: he was always of conſular and cenſorian dignity. See the article SENATE.

PRINCE's-FEATHER, in botany. See the article AMARANTHUS.

PRINCE's-METAL. See METAL.

PRINCIPAL, *Principalis*, the chief and moſt neceſſary part of a thing.

In commerce, principal is the capital of a ſum due or lent, ſo called in oppoſition to intereſt.

It alſo denotes the firſt fund put by partners into a common ſtock, by which it is diſtinguiſhed from the calls or acceſſions afterwards acquired.

PRINCIPAL *Point*, in perſpective, is a point in the perſpective plane, upon which a line drawn from the eye, perpendicular to the plane, falls. It is in the interſection of the horizontal and vertical plane, and called the point of ſight, and point of the eye.

PRINCIPAL *Ray*, in perſpective, that which paſſes perpendicularly from the ſpectator's eye to perſpective plane.

PRINCIPLE, *Principium*, in general, is uſed for the cauſe, ſource, or origin of any thing.

PRINCIPLE is alſo ſometimes uſed in a ſynonymous ſenſe with axiom or maxim. See the articles AXIOM and MAXIM.

PRINOS, the winter-berry, in botany, a genus of plants, whoſe flower is monopetalous and rotated, with the limb divided into ſix plane ſegments. The fruit is a roundiſh berry, having ſix cells, containing ſolitary, oſſeous, obtuſe ſeeds.

PRINT, the impreſſion taken from a copper-plate.

PRINTER, a perſon who compoſes and takes impreſſions from moveable characters ranged in order, or front-plates engraven, by means of ink, and a preſs; or from blocks of wood cut in flowers, &c. and taken off in various colours on calicoes, linens, ſilks, &c.

PRINTING, the art of taking impreſſions from characters or figures, moveable or immoveable, on paper, linen, ſilk, &c. There are three kinds of printing, the one from moveable letters for books; the other from copper-plates for pictures; and the laſt from blocks, in which the repreſentation of birds, flowers, &c. are cut for printing calicoes, linens, &c. the firſt, called common preſs-printing, the ſecond rolling-preſs printing, and the laſt calicoe, &c. printing. The principal difference between the three conſiſts in this, that the firſt is caſt in relievo in diſtinct pieces, the ſecond engraven in creux, and the third cut in relievo, and generally ſtamped, by placing the block upon the materials to be printed, and ſtriking upon the back of it.

Progreſs of PRINTING. Who the firſt inventors of the European method of printing books were, in what city, and what year it was ſet on foot, are queſtions long diſputed among the learned. In effect, as the Grecians contended for the birth of Homer, ſo do the German printers for that of printing. Mentz, Haerlem, and Straſburg, are the warmeſt on this point of honour, and theſe are left in poſſeſſion of the queſtion, which is not yet decided: though it muſt be owned, that Mentz has always had the majority of voices. John Guttemburg, and John Fuſt, of Mentz; John Mentel, of Straſburg, and L. John Koſter, of Haerlem, are the perſons to whom this honour is ſeverally aſcribed, by their reſpective country-men; and they have all their advocates among the learned. However, their firſt eſſays were made on wooden blocks, after the Chineſe manner. The book at Haerlem, the vocabulary called Catholicon, and the pieces in the Bodleian library, and that of Bennet-college, are all performed this way; and the impreſſion appears to have been only given on one ſide of the leaves; after which the two blank ſides were paſted together. But they ſoon found the inconveniencies of this method, and therefore bethought themſelves of an improvement; which was by making ſingle letters diſtinct from one another; and theſe being firſt done in wood, gave room for a ſecond improvement, which was the making them of metal; and, in order to that, forming moulds, matrices, &c. for caſting them. See LETTER.

From this ingenious contrivance we ought to date the origin of the preſent art of of printing, contradiſtinguiſhed from the method practiſed by the Chineſe. And of this, Schoeffer, or Scheffer, firſt ſervant, and afterwards partner and ſon-in-law of Fuſt, at Mentz, above-mentioned, is pretty generally allowed to be the inventor: ſo that he may properly be reckoned the firſt printer; and the Bible, which was printed with moveable letters in 1450, the firſt printed book; the next was Auguſtine de civitate Dei; then Tully's Offices, printed about the year 1461. In theſe books they left the places of the initial letters blank, and gave them to the illuminers, to have them ornamented and painted in gold and azure, in order to render the book more beautiful, and, as ſome think, to make their books paſs for manuſcripts. Thus at preſent, in ſome curious works, the initial letter at the beginning of a book, or chapter, is ſometimes left out, and a ſpace is left for its being afterwards printed with various ornaments from a copper-plate.

Some authors tell us, that Fuſt carrying a parcel of bibles with him to Paris, and offering them to ſale as manuſcripts; the French, upon conſidering the number of books, and their exact conformity to each other, even to a point, and that it was impoſſible for the beſt book-writers to be ſo exact, concluded there was witchcraft in the caſe, and by their actually indicting him as a conjurer, or threatening to do ſo, extorted from him the ſecret: and hence the origin of the popular ſtory of Dr. Fauſtus.

From Mentz, the art of printing ſoon ſpread itſelf throughout a good part of Europe; Haerlem and Straſburg had it very early; which, as the current of authors repreſent it, occaſioned their pretending to the honour of the invention. From Haerlem it paſſed to Rome in 1467; and into England in 1468, by means of Thomas Bourchier, archbiſhop of Canterbury, who ſent W. Turner, maſter of the robes, and W. Caxton, merchant, to Haerlem to learn the art. Theſe privately prevailing with Corſeilles, an under-workman, to come over, a preſs was ſet up at Oxford, and an edition of Ruffinus on the creed was printed the ſame year in octavo. From Oxford, Caxton brought it to London about the year 1470, and the ſame year it was carried to Paris. Hitherto there had been nothing printed but in Latin, and the vulgar tongues; and this firſt in Roman characters, then in Gothic, and at laſt in Italic; but in 1480, the Italians caſt a ſet of Greek types, and they have alſo the honour of the firſt Hebrew editions which were printed about the ſame time with the Greek. Towards the end of the ſixteenth century, there appeared various editions of books, in Syriac, Arabic, Perſian, Armenian, Coptic or Egyptian characters, ſome to gratify the curioſity of the learned, and others for the uſe of the Chriſtians of the Levant. Out of Europe, the art of printing has been carried into the three other parts of the world: for Aſia, we ſee impreſſions of books at Goa, and in the Philippines; at Morocco, for Africa; at Mexico, Lima, Philadelphia, New-York, Boſton, &c. for America. The Turks, indeed, rigorouſly prohibit printing throughout their empire, as imagining that the too frequent communication with books might occaſion ſome change in their religion and government; yet the Jews have ſeveral editions of their books printed at Theſſalonia, and even at Conſtantinople.

Method of PRINTING. The printing-letters, or types, as they are ſometimes called, we have already taken notice of, and have deſcribed the method of forming and caſting them under the articles LETTER and LETTER-FOUNDERY.

The workmen employed in the art of printing are of two kinds; compoſitors, who range and diſpoſe the letters into words, lines, pages, &c. according to the copy delivered them by the author: and preſſmen, who apply ink upon the ſame, and take off the impreſſion. The types being caſt, the compoſitor diſtributes each kind by itſelf among the diviſions of two wooden frames, an upper and an under one, called caſes; each of which is divided into little cells or boxes. Thoſe of the upper caſe are in number ninety-eight; theſe are all of the ſame ſize, and in them are diſpoſed the capitals, ſmall capitals, accented letters, figures, &c. the capitals being placed in alphabetical order. In the cells of the lower-caſe, which are fifty-four, are placed the ſmall letters, with the points, ſpaces, &c. The boxes are here of different ſizes, the largeſt being for the letters moſt uſed; and theſe boxes are not in alphabetical order, but the cells which contain the letters ofteneſt wanted, are neareſt the compoſitor's hand. Each caſe is placed a little aſlope, that the compoſitor may the more eaſily reach the upper-bozes. The inſtrument in which the letters are ſet is called a compoſing-ſtick, (ſee plate LXXV. *fig.* 5.) which conſiſts of a long and narrow plate of braſs or iron, &c. *cc*, on the right ſide of which ariſes a ledge *b b*, which runs the whole length of the plate, and ſerves to ſuſtain the letters, the ſides of which are to reſt againſt it: along this ledge is a row of holes, which ſerve for introducing the ſcrew *f*, in order to lengthen or ſhorten the extent of the line, by moving the ſliders *e*, *d*, farther from, or nearer to the ſhort ledge at the end *a*. Where marginal notes are required in a work, the two ſliding pieces *e*, *d*, are opened to a proper diſtance from each other; in ſuch a manner as that while the diſtance between *d* and *c* forms the length of the line in the text, the diſtance between the two ſliding-pieces forms the length of the lines for the notes on the ſide of the page. Before the compoſitor proceeds to compoſe, he puts a rule, or thin ſlip of braſs plate, cut to the length of the line, and of the ſame height as the letter in the compoſing-ſtick, againſt the ledge, for the letter to bear againſt. Things thus prepared, the compoſitor having the copy lying before him, and his ſtick in his left-hand, his thumb being over the ſlider *d*; with the right he takes up the letters, ſpaces, &c. one by one, and places them againſt the rule, while he ſupports them with his left thumb by preſſing them to the end of the ſlider *d*; the other hand being conſtantly employed in ſetting in more letters: the whole being performed with a degree of expedition and addreſs not eaſy to be imagined.

A line thus compoſed, if it end with a word or ſyllable, and exactly fill the meaſure, there needs no farther care; otherwiſe more ſpaces are to be put in, or elſe the diſtances leſſened between the ſeveral words, in order to make the meaſure quite full; ſo that every line may end even. The ſpaces here uſed are pieces of metal exactly ſhaped like the ſhanks of the letters; theſe are of various thickneſſes, and ſerve to ſupport the letters, and to preſerve a proper diſtance between the words; but not reaching ſo high as the letters, they make no impreſſion when the work is printed. The firſt line being thus finiſhed, the compoſitor proceeds to the next; in order to which he moves the braſs-rule from behind the former, and places it before it, and thus compoſes another line againſt it, after the ſame manner as before: going on thus till his ſtick is full, when he empties all the lines contained in it into the gally. See the article GALLY.

The compoſitor then fills and empties his compoſing ſtick, as before, till a complete page be formed, when he ties it up with a cord or packthread, and ſetting it by, proceeds to the next, till the number of pages to be contained in a ſheet is completed: which done, he carries them to the impoſing-ſtone, there to be ranged in order, and faſtened together in a frame called a chaſe, and this is termed impoſing. The chaſe is a rectangular iron frame, of different dimenſions, according to the ſize of the paper to be printed, having two croſs-pieces of the ſame metal, called a long and ſhort croſs, mortiſed at each end ſo as to be taken out occaſionally. By the different ſituation of theſe croſſes the chaſe is fitted for different volumes: for quartos and octavos, one traverſes the middle lengthwiſe, the other broadwiſe, ſo as to interſect each other in the center: for twelves and twenty-fours, the ſhort croſs is ſhifted nearer to one end of the chaſe: for folios the long croſs is entirely left out, and the ſhort one left in the middle; and for broadſides both croſſes are ſet aſide. To dreſs the chaſe, or range and fix the pages therein, the compoſitor makes uſe of a ſet of furniture, conſiſting of ſlips of wood of different dimenſions, and about half an inch high, that they may be lower than the letters: ſome of theſe are placed at the top of the pages, and called head-ſticks; others between them to form the inner margin; others on the ſides of the croſſes to form the outer margin, where the paper is to be doubled; and others in the form of wedges to the ſides and bottom of the pages. Thus all the pages being placed at their proper diſtances, and ſecured from being injured by the chaſe and furniture placed about them, they are all untied, and faſtened together by driving ſmall pieces of wood, called quoins, cut in the wedge form, up between the ſlanting ſide of the foot and ſide-ſticks and the chaſe, by means of a piece of hard wood and a mallet, and all being thus bound faſt together, ſo that none of the letters will fall out, it is ready to be committed to the preſſman. In this condition the work is called a form; and as there are two of theſe forms required for every ſheet, when both ſides are to be printed, it is neceſſary the diſtances between the pages in each form ſhould be placed with ſuch exactneſs, that the impreſſion of the pages in one form ſhall fall exactly on the back of the pages of the other, which is called regiſter.

As it is impoſſible but that there muſt be ſome miſtakes in the work, either through the overſight of the compoſitor, or by the caſual tranſpoſition of letters in the caſes; a ſheet is printed off, which is called a proof, and given to the corrector; who reading it over, and rectifying it by the copy, by making the alterations in the margin, it is delivered back to the compoſitor to be corrected. For the characters uſed in correcting a ſheet for the compoſitor, ſee CORRECTION.

The compoſitor, then unlocking the form upon the correcting-ſtone, by looſening the quoins or wedges which bound the letters together, rectifies the miſtakes by picking out the faulty or wrong letters with a ſlender ſharp-pointed ſteel bodkin, and puts others into their places; but when there are conſiderable alterations, and particularly where inſertions or omiſſions are to be made, he is under a neceſſity of over-running. Thus, if one or more words to be inſerted in a line cannot be got in, by changing the ſpaces of a line for leſſer ones, part of the line muſt be put back into the cloſe of the preceding one, or forward into the beginning of the ſubſequent one, and this continued till the words are got in. After this another proof is made, ſent to the author, and corrected as before; and, laſtly, there is another proof, called a reviſe, which is made in order to ſee whether all the miſtakes marked in the laſt proof are corrected.

The preſſman's buſineſs is to work off the forms thus prepared and corrected by the compoſitor; in doing which there are four things required, paper, ink, balls, and a preſs. To prepare the paper for uſe, it is firſt to be wetted by dipping ſeveral ſheets together in water: theſe are afterwards laid in a heap over each other; and to make them take the water equally, they are all preſſed cloſe down with a weight at the top. The ink is made of oil and lamp black, for the manner of preparing which, ſee the article *Printing* INK.

The balls by which the ink is applied on the forms, are a kind of wooden funnels with handles, the cavities of which are filled with wool or hair, as is alſo a piece of allum-leather or pelt nailed over the cavity, and made extremely ſoft by ſoaking in urine, and by being well rubbed. One of theſe the preſſman takes in each hand, and applying one of them to the ink-block, dabs and works them together to diſtribute the ink equally, and then blackens the form which is placed on the preſs, by beating with the balls on the face of the letter.

The printing-preſs, repreſented in plate LXXV. *fig.* 6. is a very curious though complex machine; the body conſiſts of two ſtrong cheeks *a a*, placed perpendicularly, and joined together by four croſs-pieces; the cap *b*; the head *c*, which is moveable, being partly ſuſtained by two iron pins, or long bolts, that paſs the cap; the ſhelves *dd*, which ſerve to keep ſteady a part called the hoſe, and the winter *e*, which bears the carriage, and ſuſtains the effort of the preſs beneath. The ſpindle *f* is an upright piece of iron pointed with ſteel, having a male ſcrew which goes into the female one in the head about four inches. Through the eye *g* of this ſpindle is faſtened the bar *k*, by which the preſſman makes the impreſſion. Part of the ſpindle is incloſed in a ſquare wooden frame, called the hoſe, *h*, and its point works into a braſs pan ſupplied with oil, which is fixed to an iron plate let into the top of the platten. At each corner of the hoſe, there is an hook, faſtened with pack-thread to thoſe at each corner of the platten *i*, in ſuch a manner as to keep it perfectly level.

The carriage *l l* is placed a foot below the platten, having its fore part ſupported by a prop, called a fore-ſtay, while the other reſts on the winter. On this carriage, which ſuſtains the plank, are nailed two long iron bars, or ribs, and on the plank are nailed ſhort pieces of iron, or ſteel, called cramp-irons, equally tempered with the ribs, and which ſlide upon them when the plank is turned in or out. Under the carriage is fixed a long piece of iron, called the ſpit, with a double wheel in the middle, round which leather girts are faſtened, nailed to each end of the plank; and to the outſide of the ſpit is fixed a rounce *m*, or handle to turn round the wheel.

Upon the plank is a ſquare frame or coffin, in which is incloſed a poliſhed ſtone, on which the form *n* is laid; at the end of the coffin are three frames, viz. the two tympans and friſket: the tympans *o* are ſquare, and made of three ſlips of very thin wood, and at the top a piece of iron ſtill thinner; that called the outer tympan is faſtened with hinges to the coffin: they are both covered with parchment; and between the two are placed blankets, which are neceſſary to take off the impreſſion of the letters upon the paper.

The friſket *p* is a ſquare frame of thin iron, faſtened with hinges to the tympan; it is covered with paper cut in the neceſſary places, that the ſheet, which is put between the friſket and the great or outward tympan, may receive the ink, and that nothing may hurt the margins. To regulate the margins, a ſheet of paper is faſtened upon this tympan, which is called the tympan-ſheet, and on each ſide is fixed an iron point, which makes two holes in the ſheet, which is to be placed on the ſame points, when the impreſſion is to be made on the other ſide.

In preparing the preſs for working, the parchment which covers the outer tympan is wetted till it is very ſoft, in order to render the impreſſion more equable; the blankets are then put in, and ſecured from ſlipping by the inner tympan: then, while one preſſman is beating the letter with the balls *q*, covered with ink taken from the ink-block, the other perſon places a ſheet of white paper on the tympan-ſheet, and turns down the friſket upon it to keep the paper clean and prevent its ſlipping; then bringing the tympans upon the form, and turning the rounce, he brings the form with the ſtone, &c. weighing about three hundred pounds weight, under the platten; pulls with the bar, by which means the platten preſſes the blankets and paper cloſe upon the letter, whereby half the form is printed; then eaſing the bar, he draws the form ſtill forward, gives a ſecond pull, and letting go the bar, turns back the form, takes up the tympans and friſket, takes out the printed ſheet and lays on a freſh one; and this is repeated till he has taken off the impreſſion upon the full number of ſheets the edition is to conſiſt of. One ſide of the ſheet being thus printed, the form for the other ſide is laid upon the preſs, and worked off in the ſame manner.

Rolling-Preſs PRINTING, is employed in taking off prints or impreſſions from copper-plates engraven, etched, or ſcraped, as in mezzotintos. See the articles ENGRAVING, ETCHING, and MEZZOTINTO.

This art is ſaid to have been as ancient as the year 1540, and to owe its origin to Finiguerra, a Florentine goldſmith, who pouring ſome melted brimſtone on an engraven plate, found the exact impreſſion of the engraving left in the cold brimſtone, marked with the black taken out of the ſtrokes by the liquid ſulphur: upon this he attempted to do the ſame on ſilver plates, with wet paper, by rolling it ſmoothly with a roller; and this ſucceeded: but this art was not uſed in England till the reign of king James I. when it was brought from Antwerp by Speed.

The form of the rolling-preſs, the compoſition of the ink uſed therein, and the manner of applying both in taking off prints, are as follow:

The rolling preſs AL (plate LXXV. *fig.* 7.) may be divided into two parts, the body and carriage: the body conſiſts of two wooden cheeks, PP, placed perpendicularly on a ſtand or foot LM, which ſuſtains the whole preſs. From the foot likewiſe ariſe four other perpendicular pieces, *c*, *c*, *c*, *c*, joined by other croſs or horizontal ones, *d*, *d*, *d*, which ſerve to ſuſtain a ſmooth even plank or table HIK, about four feet and a half long, two feet and a half broad, and an inch and a half thick. Into the cheeks go two wooden cylinders or rollers, DE, FG, about ſix inches in diameter, borne up at each end by the cheeks, whoſe ends, which are leſſened to about two inches diameter, and called trunnions, turn in the cheeks between two pieces of wood in form of half-moons, lined with poliſhed iron to facilitate the motion. Laſtly, to one of the trunnions of the upper roller is faſtened a croſs, conſiſting of two levers, A, B, or pieces of wood, traverſing each other, the arms of which croſs ſerve inſtead of the bar or handle of the letter-preſs, by turning the upper roller, and when the plank is between the two rollers, giving the ſame motion to the under one, by drawing the plank forward and backward.

The ink uſed for copper-plates, is a compoſition made of the ſtones of peaches and apricots, the bones of ſheep, and ivory, all well burnt, and called Frankfort-black, mixed with nut-oil that has been well boiled, and ground together on a marble, after the ſame manner as painters do their colours.

The method of printing from copper-plates is as follows: they take a ſmall quantity of this ink on a rubber made of linen rags, ſtrongly bound about each other, and therewith ſmear the whole face of the plate as it lies on a grate over a charcoal fire. The plate being ſufficiently inked, they firſt wipe it over with a foul rag, then with the palm of the left hand, and then with that of the right; and to dry the hand and forward the wiping, they rub it from time to time on whiting. In wiping the plate perfectly clean, yet without taking the ink out of the engraving, the addreſs of the workman conſiſts. The plate thus prepared, is laid on the plank of the preſs; over the plate is laid the paper, firſt well moiſtened, to receive the impreſſion, and over the paper two or three folds of flannel. Things thus diſpoſed, the arms of the croſs are pulled, and by that means, the plate with its furniture, paſſed thro' between the rollers, which pinching very ſtrongly, yet equally, preſſes the moiſtened paper into the ſtrokes of the engraving, whence it licks out the ink.

PRIOR, in general, ſomething before or nearer the beginning than another, to which it is compared.

PRIOR, more particularly, denotes the ſuperior of a convent of monks, or the next under the abbot. See the article ABBOT.

Grand PRIOR, is the ſuperior of a large abbey, where ſeveral ſuperiors are required.

PRISCILLIANISTS, in church hiſtory, chriſtian heretics, ſo called from their leader Priſcillian, a Spaniard by birth, and biſhop of Avila.

He is ſaid to have practiſed magic, and to have maintained the principal errors of the Manichees; but his peculiar tenet was, that it is lawful to make falſe oaths, in order to ſupport one's cauſe and intereſts.

PRISM, in geometry, an oblong ſolid, contained under more than four planes, whoſe baſes are equal, parallel, and alike ſituated.

PRISM, in dioptrics, a triangular glaſs priſm, much uſed in experiments about the nature of light and colours.

PRISMOID, *Priſmoides*, in geometry, a ſolid figure, bounded by ſeveral planes, whoſe baſes are right-angled parallelograms, parallel, and alike ſituated.

PRISON, a goal, or place of confinement.

PRISONER, a perſon reſtrained or kept in priſon upon an action civil or criminal, or upon commandment: and one may be a priſoner on matter of record or matter of fact.

A priſoner upon matter of record, is he who being preſent in court, is by the court committed to priſon; and the other is one carried to priſon upon an arreſt, whether it be by the ſheriff, conſtable, or other officer.

PRIVATEERS, in maritime affairs, a kind of private ſhips of war, fitted out by private perſons at their own expence; who have leave granted them to keep what they can take from the enemy, allowing the admiral his ſhare.

PRIVATIVE, in grammar, a particle which, when prefixed to a word, changes it into a contrary ſenſe.

Among the Greeks, the α is uſed as a privative, and among the Latins, *in*. The Engliſh, French, &c. borrow both the Greek and Latin privatives.

PRIVATIVE QUANTITY, or NEGATIVE QUANTITY, in algebra, denotes a quantity leſs than nothing, in oppoſition to affirmative or poſitive; and is expreſſed by this ſign —, minus, prefixed thereto.

PRIVET, *Liguſtrum*, in botany. See the article LIGUSTRUM.

PRIVILEGE, in law, ſome peculiar benefit granted to certain perſons or places, contrary to the uſual courſe of the law.

PRIZE, or PRISE, in maritime affairs, a veſſel taken at ſea from the enemies of a ſtate, or from pirates; and that either by a man of war, a privateer, &c. having a commiſſion for that purpoſe.

PROBABILITY, is nothing but the appearance of the agreement or diſagreement of two ideas by the intervention of proofs whoſe connection is not conſtant and immutable, or is not perceived to be ſo; but is, or appears for the moſt part to be ſo, and is enough to induce the mind to judge the propoſition to be true or falſe, rather than the contrary.

PROBABILITY, in poetry, the appearance of truth in the fable or action of a poem.

PROBATE *of a Will or Teſtament*, in law, is the exhibiting and proving of laſt wills and teſtaments, before the eccleſiaſtical judge, delegated by the biſhop who is ordinary of the place where the party died.

PROBATION, in the univerſities, is the examination and trial of a ſtudent who is about to take his degrees.

Probation, in a monaſtic ſenſe, ſignifies the year of novitiate which a religious muſt paſs in a convent, to prove his virtue and vocation, and whether he can bear the ſeverities of the rule.

PROBATIONER, in the church of Scotland, a ſtudent in divinity, who bringing a certificate from a profeſſor in an univerſity of his good morals, and his having performed his exerciſes to approbation, is admitted to undergo ſeveral trials.

PROBATOR, in law, one who undertakes to prove a crime charged upon another; properly, an accomplice in the crime who impeaches others.

PROBATUM Est, *it is proved*, a term frequently ſubjoined to a receipt for the cure of ſome diſeaſe.

PROBE, a ſurgeon's inſtrument for examining the circumſtances of wounds, ulcers, and other cavities, ſearching for ſtones in the bladder, &c.

PROBLEM, ϖροβλημα, in logic, a propoſition that neither appears abſolutely true or falſe; and, conſequently, may be aſſerted either in the affirmative or negative.

Problem, in geometry, is a propoſition, wherein ſome operation or conſtruction is required; as to divide a line or angle, erect or let fall perpendiculars, &c.

Problem, in algebra, is a queſtion or propoſition which requires ſome unknown truth to be inveſtigated, and the truth of the diſcovery demonſtrated.

PROBLEMATICAL Resolution, in algebra, a method of ſolving difficult queſtions by certain rules, called canons.

PROBOSCIS, in natural hiſtory, is the trunk or ſnout of an elephant, and ſome other animals and inſects.

Flies, gnats, &c. are furniſhed with a proboſcis, or trunk; by means of which they ſuck the blood of animals, the juice of vegetables, &c. for their food.

PROCEED, among merchants, whatever ariſes from any thing.

PROCESS, in law, denotes the proceedings in any cauſe, real or perſonal, civil or criminal, from the original writ to the end thereof.

Process, in chemiſtry, the whole courſe of an experiment or ſeries of operations, tending to produce ſomething new.

Process, *Proceſſus*, in anatomy, denotes any protuberance or eminence in a bone.

PROCKIA, in botany, a genus of plants, whoſe flower hath no corolla; the cup is cut into three oval ſegments, and contains a great number of capillary filaments, topped with roundiſh antheræ: the fruit is a berry, having five angles, and includes many ſeeds.

PROCLAMATION, a public notice given of any thing of which the king thinks proper to advertiſe his ſubjects.

PROCONSUL, a Roman magiſtrate, ſent to govern a province with conſular authority.

Proconsul, in our ancient law-books, is the ſame with juſtice in eyre. See the article Justice.

PROCREATION, the begetting and bringing forth children. See the article Generation.

PROCTOR, a perſon commiſſioned to manage another perſon's cauſe, in any court of the civil or eccleſiaſtical law.

The proctors of the clergy, are the repreſentatives choſen by the clergy, to ſit in the lower houſe of convocation: of theſe there are two for each dioceſe, and one for each collegiate church.

Proctors, in an univerſity, are two officers choſen from among the ſtudents to ſee good order and exerciſes daily performed.

PROCURATION, or Procuracy, an act or inſtrument by which a perſon is impowered to treat, tranſact, receive, &c. in another perſon's name.

This word is now little uſed in this ſenſe, except in the caſe of a perſon who collects the fruits of a benefice for another.

The ſame word is uſed for certain ſums of money annually paid by pariſh-prieſts to the biſhop or archdeacon, on account of viſitation, and which, in former times, were paid in neceſſary victuals and proviſions for the viſitor and his attendants.

PROCURATOR, a perſon who has a charge committed to him to act for another.

PROCYON, in aſtronomy, a fixed ſtar of the ſecond magnitude, in the conſtellation called Canis Minor. See the article Canis.

PRODUCING, in geometry, ſignifies the drawing out a line farther till it have any aſſigned length.

PRODUCT, in arithmetic and geometry, the factum of two or more numbers, or lines, &c. into one another: thus $5 \times 4 = 20$, the product required.

In lines it is always (and in numbers ſometimes) called the rectangle between the two lines, or numbers, multiplied by one another.

PRODUCTION, in anatomy, the ſame with proceſs. See the article Process.

PROEM, a term ſometimes uſed for prelude or preface.

PROEMPTOSIS, in aſtronomy, the appearance of the new moon a day later, by reaſon of the lunar equation. See the article Moon.

PROFESSOR, in the univerſities, a perſon who teaches or reads public lectures in ſome art or ſcience from a chair for the purpoſe.

PROFILE, in architecture, the draught of a building, fortification, &c. wherein are expreſſed the ſeveral heights, widths, and thickneſſes, ſuch as they would appear, were the building cut down perpendicularly from the roof to the foundation. It is alſo called ſection, orthographical ſection, and, by Vitruvius, ſciagraphy. This is the ſame as elevation, in oppoſition to a plan, ichnography.

Profile alſo denotes the outline of a figure, building, member of architecture, &c. Hence profiling ſometimes denotes deſigning or deſcribing the member with a rule, compaſs, &c.

Profile, in ſculpture and painting, denotes a head, portrait, &c. when repreſented ſideways, or in a ſide view. On almoſt all medals, faces are repreſented in profile.

PROGNOSTIC, προγνωσις, among phyſicians, ſignifies a judgment concerning the event of a diſeaſe, as whether it ſhall end in life or death, be ſhort or long, mild or malignant, &c.

PROGRESSION, in general, denotes a regular advancing, or going forward, in the ſame courſe and manner.

Progression, in mathematics, is either arithmetical or geometrical. Continued arithmetic proportion, where the terms do increaſe and decreaſe by equal differences, is called arithmetic progreſſion:

$$\text{thus}\left\{\begin{array}{l} a,\ a+d,\ a+2d,\ a+3d,\ \text{\&c. increaſing} \\ a,\ a-d,\ a-2d,\ a-3d,\ \text{\&c. decreaſing}\end{array}\right\}\text{by the difference } d.$$

$$\text{In numbers}\left\{\begin{array}{l} 2,\ 4,\ 6,\ 8,\ 10,\ \text{\&c. increaſing} \\ 10,\ 8,\ 6,\ 4,\ 2,\ \text{\&c. decreaſing}\end{array}\right\}\text{by the difference 2.}$$

But ſince this progreſſion is only a compound of two ſeries, viz.

$$\text{of}\left\{\begin{array}{llllll} \text{Equals} & a, & a, & a, & a, & a, \\ \text{Arith. proportionals } 0, & \pm d, & \pm 2d, & \pm 3d, & \pm 4d, & \end{array}\right\}\text{\&c.}$$

Therefore the moſt natural arithmetic progreſſion is that which begins with 0: as

$$0,\ \pm d,\ \pm 2d,\ \pm 3d,\ \pm 4d,\ \left\{\begin{array}{l}\text{increaſing.}\\ \text{decreaſing.}\end{array}\right.$$

$$\text{In any arithmetical progreſſion, if}\left\{\begin{array}{c} a \\ d \\ n \\ l \\ s\end{array}\right\}\text{be the}\left\{\begin{array}{l}\text{firſt term,}\\ \text{common difference,}\\ \text{number of terms,}\\ \text{laſt term,}\\ \text{ſum of all the terms;}\end{array}\right\}\begin{array}{l}\text{then any three of theſe terms}\\ \text{being given, the other two}\\ \text{are eaſily found.}\end{array}$$

And the ſeveral caſes are reducible into ten propoſitions, which are all ſolved by the two following lemmata.

Lemma I. In any arithmetic progreſſion, it is, $1 : \frac{n}{2} :: a + l : s$

$$\text{For}\left\{\begin{array}{l} a \\ a+d \\ a+2d \\ a+3d \\ \text{\&c.}\end{array}\right\}+\left\{\begin{array}{l} l \\ l-d \\ l-2d \\ l-3d \\ \text{\&c.}\end{array}\right\}=\left\{\begin{array}{l} a+l \\ a+l \\ a+l \\ a+l \\ \text{\&c.}\end{array}\right\}$$

Therefore $s + s = \overline{a + l} \times n$. That is, $2s = \overline{a+l} \times n$. Conſequently, $1 : \frac{n}{2} :: a + l : s$.

From this the following corollaries naturally follow.

Cor. I. $a = \frac{2s}{n} - l = \frac{2s - nl}{n} = 2s - nl \times \frac{1}{n}$.

Cor. II. $n = \frac{2s}{a+l} = 2 \times \frac{s}{a+l} = 2s \times \frac{1}{a+l}$.

Cor. III. $l = \frac{2s}{n} - a = \frac{2s - na}{n} = 2s - na \times \frac{1}{n}$.

Cor. IV. $s = \frac{n}{2} \times \overline{a + l} = \frac{n \times \overline{a+l}}{2} = \frac{na + nl}{2} = n \times \frac{a+l}{2}$.

Lemma II. In any arithmetical progreſſion it is $1 : n - 1 :: d : l - a$.

For, $a,\ a + d,\ a + 2d,\ a + 3d,\ a + \overline{d - 1} \times d = l$. That is, $n - 1 \times d = l - a$, by tranſpoſition. Therefore, $1 : n - 1 :: d : l - a$.

From this likewiſe the four following corollaries are decuced.

Cor. I. $a = l - \overline{n - 1} \times d = l - nd + d$.

Cor. II. $n = \frac{l-a}{d} + 1 = \frac{l - a + d}{d}$.

Cor. III. $d = \frac{l-a}{n-1} = l - a \times \frac{1}{n-1}$.

Cor. IV. $l = a + n - 1 \times d = a + nd - d$.

Geometric **Progression**, or continued geometric proportion, is when the terms do increaſe or decreaſe by uqual ratios: thus,

$$\left.\begin{array}{l} a,\ ar,\ arr,\ arrr,\ \text{\&c. increaſing} \\ a,\ \frac{a}{r},\ \frac{a}{rr},\ \frac{a}{rrr},\ \text{\&c. decreaſing}\end{array}\right\}\text{from a continual}\left\{\begin{array}{l}\text{multiplication}\\ \text{diviſion}\end{array}\right\}\text{by } r.$$

$$\left.\begin{array}{l} 2,\ 4,\ 8,\ 16,\ 32,\ 64,\ \text{increaſing} \\ 64,\ 32,\ 16,\ 8,\ 4,\ 2,\ \text{decreaſing}\end{array}\right\}\text{from a continual}\left\{\begin{array}{l}\text{multiplication}\\ \text{diviſion}\end{array}\right\}\text{by 2.}$$

But ſince this progreſſion is only a compound of two ſeries, viz.

$$\text{of}\left\{\begin{array}{lllllll}\text{Equals} & a, & a, & a, & a, & a, & a,\\ \text{Geometric proportion,} & 1, & r, & r^2, & r^3, & r^4, & r^5\end{array}\right\}\ \&c.$$

therefore the moſt natural progreſſion is that which begins with unity.

$$\left.\begin{array}{lllllll}\text{as} & \frac{1}{1}, & \frac{r}{1}, & \frac{r^2}{1}, & \frac{r^3}{1}, & \frac{r^4}{1}, & \frac{r^5}{1}\\ \text{that is,} & 1, & r, & r^2, & r^3 & r^4 & r^5\end{array}\right\}\ \&c.\ \text{increaſing.}$$

$$\left.\begin{array}{lllllll}\text{as} & \frac{1}{1}, & \frac{1}{r}, & \frac{1}{r^2}, & \frac{1}{r^3}, & \frac{1}{r^4}, & \frac{1}{r^5}\\ \text{that is,} & 1, & r^{-1}, & r^{-2} & r^{-3} & r^{-4} & r^{-5}\end{array}\right\}\ \&c.\ \text{decreaſing.}$$

In geometric progreſſion,

$$\text{If}\left\{\begin{array}{l}a\\ r\\ n\\ l\\ s\end{array}\right\}\text{be the}\left\{\begin{array}{l}\text{firſt term,}\\ \text{the ratio,}\\ \text{number of terms,}\\ \text{laſt term,}\\ \text{ſum of all the terms;}\end{array}\right\}\begin{array}{l}\text{then any three of theſe terms being given,}\\ \text{the other two are eaſily found.}\end{array}$$

And the ſeveral caſes are reducible to ten propoſitions, which are ſolved by the two following lemmata:

Of increaſing progreſſions.

Lem. I. In an increaſing geometric progreſſion a, ar, ar^2, ar^3, ar^4, ar^5, &c. it is $1:r::s-l:s-a$.

For $a:ar::s-l\ s-a$.

But $a:ar::1:r$.

Therefore $1:r::s-l:s-a$.

Cor. 1. $s.=\frac{rl-a}{r-1}=\frac{l-a}{r-1}+l$.

Cor. 2. $r=\frac{s-a}{s-l}=\overline{s-a}\times\frac{1}{s-l}$.

Cor. 3. $a=s+rl-rs=rl-s\times\overline{r-1}$.

Cor. 4. $l=\frac{rs-s+a}{r}=\frac{a+\overline{r-1}\times s}{r}=s-\frac{s-a}{r}$.

Lem. II. In an increaſing geometric progreſſion it is $1:r^{n-1}::a:l$.

For a, ar, ar^2, ar^3, ar^4, &c. $ar^{n-1}=l$.

Therefore $1:r^{n-1}::a:l$.

Cor. 1. $l=ar^{n-1}=a\times r^{n-1}$.

Cor. 2. $a=\frac{l}{r^{n-1}}=l\times\frac{1}{r^{n-1}}$.

Cor. 3. $n=\frac{\text{L.}\,r^{n-1}}{\text{L.}\,r}+1=\frac{\text{L.}\,l-\text{L.}\,a}{\text{L.}\,r}+1$; that is, the logarithm l — the logarithm of a, divided by the logarithm of r.

Cor. 4. $r=\overline{l\div a}^{\frac{1}{n-1}}$

PROHIBITED Goods, in commerce, the ſame with contraband goods.

PROHIBITION, in law, is a writ that iſſues out of the chancery, king's-bench, or common-pleas, to prohibit ſome other court, either ſpiritual or ſecular, to proceed in a cauſe there depending, upon a ſuggeſtion that the cauſe does not belong to the court.

PROJECTILES, are ſuch bodies as being put in a violent motion by any great force, are then caſt off or let go from the place where they received their quantity of motion; as a ſtone thrown from a ſling, an arrow from a bow, a bullet from a gun, &c.

It is uſually taken for granted, by thoſe who treat of the motion of projectiles, that the force of gravity near the earth's ſurface is every where the ſame, and acts in parallel directions; and that the effect of the air's reſiſtance upon very heavy bodies, ſuch as bombs and cannon-balls, is too ſmall to be taken into conſideration.

The famous Sir Iſaac Newton has ſhewn, that the gravity of bodies which are above the ſuperficies of the earth, is reciprocally as the ſquares of their diſtances from its center; but the theorems concerning the deſcent of heavy bodies, demonſtrated by Gallilæus, Huygens, and others, are built upon this foundation, that the action of gravity is the ſame at all diſtances: and the conſequences of this hypotheſis are found to be very nearly agreeable to experience. For it is obvious, that the error ariſing from the ſuppoſition of the gravity's acting uniformly, and in parallel lines, muſt be exceeding ſmall; becauſe even the greateſt diſtance of a projectile above the ſurface of the earth, is inconſiderable, in compariſon of its diſtance from the center, to which the gravitation tends. But then, on the other hand, it is very certain, that the reſiſtance of the air to very ſwift motions, is much greater than it has been commonly repreſented. Nevertheleſs, (in the application of this doctrine to gunnery) if the amplitude of the projection, anſwering to one given elevation, be firſt found by experiment (which we ſuppoſe) the amplitudes in all other caſes, where the elevations and velocities do not very much differ from the firſt, may be determined, to a ſufficient degree of exactneſs, from the foregoing hypotheſis: becauſe, in all ſuch caſes, the effects of the reſiſtance will be nearly as the amplitudes themſelves; and were they accurately ſo, the proportions of the ampli-

Projection.

Stereographic Projection of the Sphere.

Fig. 1.

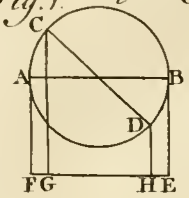


Fig. 2.

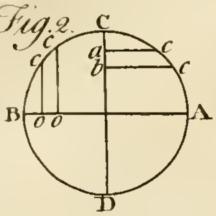


Fig. 3.

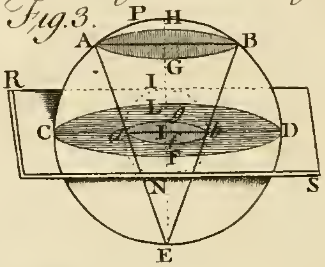


Fig. 4.

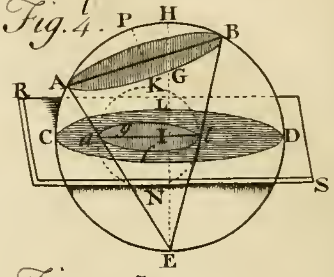


Fig. 5.

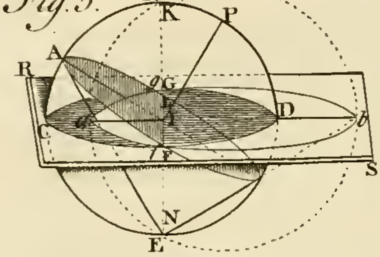


Fig. 6.

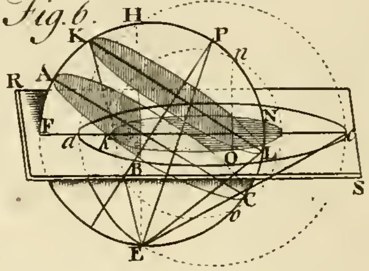


Fig. 7.

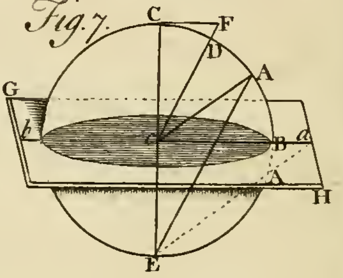


Fig. 8.

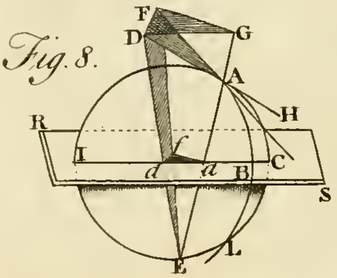


Fig. 9.

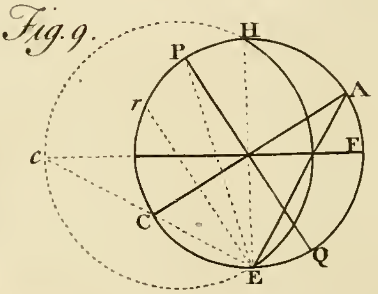


Fig. 10.

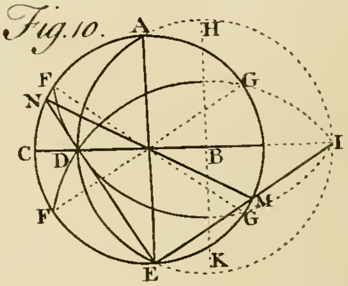


Fig. 11.

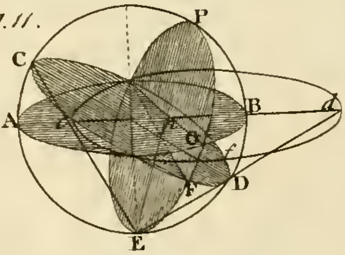
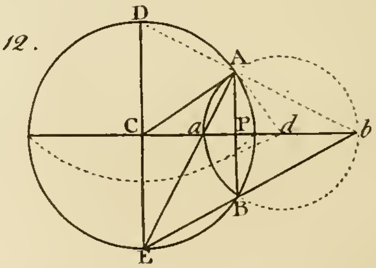


Fig. 12.



Protractor.

Fig. 13.

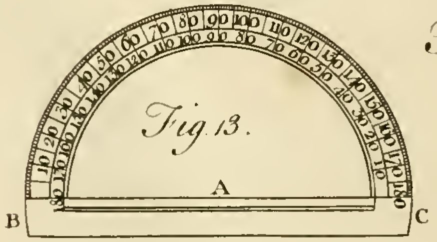
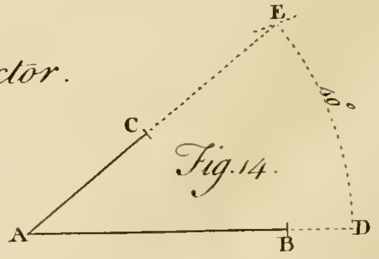


Fig. 14.



J. Lodge sculp.

amplitudes, at different elevations, would then be the very ſame as in vacuo. See RESISTANCE.

Now, in order to form a clear idea of the ſubject here propoſed, the path of every projectile is to be conſidered as depending on two different forces; that is to ſay, on the impellant force, whereby the motion is firſt begun (and would be continued in a right line) and on the force of gravity, by which the projectile, during the whole time of its flight, is continually urged downward, and made to deviate more and more from its firſt direction.

PROJECTION, in mechanics, the act of communicating motion to a body, from thence called projectile. See the preceding article.

In proſpective, projection is the appearance or repreſentation of an object on the perſpective plane. See the article PERSPECTIVE.

The projection of the ſphere is either orthographic, or ſtereographic.

The former, or orthographic projection, ſuppoſes the eye placed at an infinite diſtance; whereas, in the ſtereographic projection, it is ſuppoſed to be only 90° diſtant from the primitive circle, or placed in its pole, and thence viewing the circles on the ſphere. The primitive circle is that great circle which limits or bounds the repreſentation or projection; and the place of the eye is called the projecting point.

The laws of the orthographic projection are theſe:

1. The rays by which the eye, placed at an infinite diſtance, perceives any objects are parallel.

2. A right line, perpendicular to the plane of the projection, is repreſented by a point, where it cuts the plane of the projection.

3. A right line, as A B, or C D, (Plate LXXVI. *fig.* 1.) not perpendicular, is projected into a right line, as F E and G H, and is always comprehended between the extreme perpendiculars A F and B E, and C G and D H.

4. The projection of the right line, A B, is the greateſt when it is parallel to the plane of projection; being projected in a right line equal to itſelf.

5. But an oblique line is always projected into one leſs than itſelf; and the more ſo, the nearer it approaches to a perpendicular, which, as already obſerved, is projected into a point.

6. A plane ſurface, as A B C D (*fig.* 2) at right angles to the plane of the projection, is projected into the right line A B, in which it cuts the plane of the projection; and any arch as B *c*, *c c*, or *c* A, is projected into the correſponding lines B *o*, *o o*, and *o* A.

7. A circle parallel to the plane of projection, is repreſented by a circle equal to itſelf; and a circle oblique to the plane of projection, is repreſented by an ellipſis; for the method of putting theſe rules in practice, ſee the article MAP.

As to the ſtereographic projection, its laws are theſe:

1. The repreſentations of all circles, not paſſing through the projecting point, will be circles. Thus, let A C E D B (*fig.* 3, 4, 5.) repreſent a ſphere, cut by a plane R S, paſſing through the center I, at right angles, to the diameter E H, drawn from E, the place of the eye; and let the ſection of the ſphere by the plane R S, be the circle C F D L, whoſe poles are H and E. Suppoſe now A G B is a circle on the ſphere to be projected, whoſe pole moſt remote from the eye is P; and the viſual rays from the circle A G B, meeting in E, form the cone A G B E, whereof the triangle A E B is a ſection through the vertex E, and diameter of the baſe A B: then will the figure *a g b f*, which is the projection of the circle A G B, be itſelf a circle: for if the plane R S is ſuppoſed to revolve on the line C D, till it coincides with the plane of the circle A C E B; then will the circle C F D L coincide with the circle C E D H, and the projected circle *a f b g* with the circle *a* N *b* K. Hence, the middle of the projected diameter, is the center of the projected circle, whether it be a great circle or a ſmall one; the poles and centers of all circles, parallel to the plane of projection, fall into the center of the projection; and all oblique great circles cut the primitive circle in two points diametrically oppoſite.

2. The projected diameter of any circle ſubtends an angle at the eye equal to the diſtance of that circle from its neareſt pole, taken on the ſphere; and that angle is biſected by a right line, joining the eye and that pole. Thus let the plane R S (*fig.* 6.) cut the ſphere H F E G, through its center I; and let A B C be any oblique great circle, whoſe diameter A C is projected in *a c*; and K O L, any ſmall circle parellel to A B C, whoſe diameter K L is projected in *k l*. The diſtances of thoſe circles from their pole P, being the arches A H P, K H P; and the angles *a* E *c*, *k* E *l*, are the angles at the eye, ſubtended by their projected diameters, *a c*, *k l*. Then is the angle *a* E *c* meaſured by the arch AHP, and the angle *k* E *l* meaſured by the arch K H P, and thoſe angle are biſected by E P.

3. Any point of a ſphere is projected at the diſtance of the tangent of half the arch intercepted between that point and the pole oppoſite to the eye, from the center of projection; the ſemi-diameter of the ſphere being radius. Thus, let C *b* E B (*fig.* 7) be a great circle of the ſphere, whoſe center [illegible] G H the plane of projection cutting the di[illegible] the ſphere in *b*, B; E C, the poles of [illegible] that plane; and *a*, the projection of A[illegible] *c a* = the tangent of half the arch A C, a[illegible] dent by drawing C F = the tang[illegible] arch, and joining *c* F.

4. The angle made by two p[illegible] equal to the angle which theſe circle[illegible]

ſphere. For let I A C E and A B L (*fig.* 8.) be two circles on a ſphere interſecting in A; E the projecting point; and R S the plane of projection, wherein the point A is projected in a, in the line I C the diameter of the circle A C E. Alſo let D H, F A, be tangents to the circles A C E, A B L. Then will the projected angle daf be equal to the ſpherical angle B A C.

5. The diſtance between the poles of the primitive circle and an oblique circle, is equal to the tangent of half the inclination of thoſe circles; and the diſtance of their centers, is equal to the tangent of their inclination, the ſemi-diameter of the primitive being radius.

For let A C (*fig.* 9.) be the diameter of a circle, whoſe poles are P and Q, and inclined to the plane of projection in the angle A I F; and let a, c, p, be the projections of the points A, C, P; alſo let $\mathrm{H}a\mathrm{E}$ be the projected oblique circle, whoſe center is q. Now, when the plane of projection becomes the primitive circle, whoſe pole is I, then is $\mathrm{I}p =$ tangent of half the angle A I F, or of half the arch A F; and $\mathrm{I}q =$ tangent of A F, or of the angle $\mathrm{FH}a = \mathrm{AIF}$.

6. If, through any given point in the primitive circle, an oblique circle be deſcribed, then the centers of all other oblique circles paſſing through that point, will be in a right-line drawn through the center of the firſt oblique circle at right-angles to a line paſſing through that center, the given point, and the center of the primitive: thus, let G A C E (*fig.* 10.) be the primitive circle, A D E I a great circle deſcribed through D, its center being B. H K is a line drawn through B, perpendicular to a right-line C I, paſſing through D, B, and the center of the primitive circle. Then the centers of all other great circles, as F D G, paſſing through D, will fall into the line H K.

7. Equal arches of any two great circles of the ſphere, will be intercepted between two other circles drawn on the ſphere through the remoteſt poles of thoſe great circles. For let P B E A (*fig.* 11.) be a ſphere, whereon A G B, C F D, are two great circles, whoſe remoteſt poles are E, P; and thro' theſe poles let the great circle P B E C, and the ſmall circle P G E, be drawn, interſecting the great circles A G B, C F D, in the points B, G, and D, F: then are the intercepted arches B G and D F equal to one another.

8. If lines be drawn from the projected pole of any great circle, cutting the peripheries of the projected circle and plane of projection, the intercepted arches of thoſe circumferences are equal; that is, the arch $\mathrm{GB} = fd$.

9. The radius of any ſmall circle, whoſe plane is perpendicular to that of the primitive circle, is equal to the tangent of that leſſer circle's diſtance from its pole; and the ſecant of that diſtance, is equal to the diſtance of the centers of the primitive and leſſer circle. For let P (*fig.* 12.) be the pole, and A B the diameter of a leſſer circle, its plane being perpendicular to that of the primitive circle, whoſe center is C: then d being the center of the projected leſſer circle, da is equal to the tangent of the arch P A, and $d\mathrm{C} =$ ſecant of P A.

PROJECTURE, in architecture, the out-jetting, prominency, or emboſſing, which the mouldings, and other members, have beyond the naked wall, column, &c. and is always in proportion to the height.

PROLAPSUS, in ſurgery, a prolapſion, or falling out of any part of the body from its natural ſituation: thus we ſay, prolapſus inteſtini, a prolapſion of the inteſtine, &c.

PROLAPSUS ANI, is ſuch a prolapſion of the inteſtinum rectum, that it is frequently inverted, or prolapſed to ſuch a degree, both in adults and infants, as to appear near a handbreadth hanging out of its natural ſituation.

PROLAPSUS OCULI, is a diſtemperature of the eye, in which it is ſo violently inflamed and ſwelled, that it cannot be contained in its orbit, but protudes itſelf out of its natural ſeat.

PROLAPSUS UTERI, is when the uterus falls down and appears out of the vagini; whereas when it only deſcends into the vagina, it is termed a deſcent, or bearing down of the womb.

PROLATE, in geometry, an epithet applied to a ſpheroid, produced by the revolution of a ſemi-ellipſis about its larger diameter.

PROLATION, in muſic, the art of ſhaking, or making ſeveral inflections of the voice, or ſound, on the ſame note or ſyllable.

PROLEGOMENA, in philology, certain preparatory obſervations, or diſcourſes, prefixed to a book, &c. containing ſomething neceſſary for the reader to be appriſed of, to enable him the better to underſtand the book, or to enter deeper into the ſcience, &c.

PROLEPSIS, ϖϱοληψις, a figure in rhetoric, by which we anticipate or prevent what might be objected by the adverſary; thus, *it may be objected*, &c.

PROLEPTIC, ϖϱολεπτικος, an epithet applied to a periodical diſeaſe which anticipates, or whoſe paroxiſm returns ſooner and ſooner every time, as is frequently the caſe in agues.

PROLIFIC, ſomething that has the qualities neceſſary for generating.

PROLIXITY, in diſcourſe, the fault of entering into two minute a detail, of being too long, preciſe, and circumſtantial, even to a degrees of tedioufneſs.

PROLOCUTOR *of the Convocation*, the ſpeaker or chairman of that aſſembly.

PROLOGUE, *Prologus*, in dramatic poetry, a diſcourſe addreſſed to the audience before the drama or play begins.

The original intention was to advertiſe the audience of the ſubject of the piece, and to prepare them to enter more eaſily into the action and ſometimes to make an apology for the poet. This laſt article ſeems intirely to have taken poſſeſſion of the prologue in the Britiſh drama.

The French have left off the uſe of prologues: thoſe few they uſe have nothing in them of the genuine prologue, as bearing no relation to the ſubject, but being mere flouriſhes or harangues in praiſe of the king, &c.

In the ancient theatre, the prologus was properly the actor who rehearſed the prologue: the prologus was eſteemed one of the dramatis perſonæ, and never appeared in the piece in any other character: the prologue, therefore, among them, tho' not an eſſential, was yet an acceſſary part of the piece; with us it is no part at all, but ſomething intirely diſtinct and ſeparate: with them the drama was opened with the appearance of the prologus; with us it is not opened till after the prologus is retired. With us he always directs his ſpeech to the audience, conſidered as in a play-houſe; but with them he ought in propriety to have ſpoken to a chorus of by-ſtanders, or perſons to be preſent at the real action: but this being in a great meaſure inconſiſtent with the deſign of a prologue, it was directed to the audience.

The prologue is of much more ancient ſtanding than the epilogue. See the article Epilogue.

PROMETHEUS, in the ancient aſtronomy, the name of the conſtellation now called Hercules. See the article Hercules.

PROMISE, in law, is when, upon any valuable conſideration, one binds himſelf by word of mouth to another, to perform a thing agreed on.

It is held upon ſuch a promiſe, that action will lie for breach, which will not if the promiſe be without conſideration, that being a naked bargain, from which no action can ariſe.

PROMONTORY, in geography, a high point of land, or rock, projecting out into the ſea; the extremity of which towards the ſea, is called a cape, or head-land.

PROMPTER, in the drama, an officer poſted behind the ſcenes, whoſe buſineſs it is to watch attentively the actors' ſpeaking on the ſtage, in order to ſuggeſt and put them forward when at a ſtand, to correct them when amiſs, &c. in their parts.

PRONAOS, in the ancient architecture, a porch to a church, palace, or other ſpacious building. See the article Porch.

PRONG-Hoe, in huſbandry, the name of an inſtrument uſed to hoe or break the ground near and among the roots of plants.

The prong-hoe conſiſts of two hooked points, of ſix or ſeven inches length; and when ſtruck into the ground, will ſtir and remove it the ſame depth as the plough does; and thus anſwer both the ends of cutting up the weeds, and opening the land.

The prong-hoe comes into excellent uſe even in the horſe-hoeing huſbandry; and in this the hoe-plough can only come within three or four inches of the rows of the corn, turneps, and the like; but this inſtrument may be uſed afterwards; and with it the land may be raiſed and ſtirred, even to the very ſtalk of the plant.

PRONOUN, *Pronomen*, in grammar, a declineable part of ſpeech, which being put inſtead of a noun, points out ſome perſon or thing.

Pronouns are divided into the ſix following claſſes: demonſtrative pronouns, relative pronouns, poſſeſſive pronouns, gentile pronouns (or ſuch as denote a perſon's country, as *noſtras*, *veſtras*, and *cujas*) interrogative pronouns, and reciprocal pronouns. See the articles Demonstrative, Relative, Possessive, &c.

PRONUNCIATION, *Pronunciatio*, in grammar, the manner of articulating or ſounding the words of a language.

Pronounciation makes much the moſt difficult part of a written grammar; in regard that a book expreſſing itſelf to the eyes, in a matter that wholly concerns the ears, ſeems next akin to that of teaching the blind to diſtinguiſh colours: hence it is, that there is no part ſo defective in grammar as that of the pronunciation, as the writer has frequently no term whereby to give the reader an idea of the ſound he would expreſs: for want of a proper term, therefore, he ſubſtitutes a vicious and precarious one. To give a juſt idea of the pronunciation of a language, it ſeems neceſſary to fix as nearly as poſſible all the ſeveral ſounds employed in the pronunciation of that language.

Cicero tells us, that the pronunciation underwent ſeveral changes among the Romans; and, indeed, it is more precarious in the living languages, being, as Du Bos tells us, ſubſervient to faſhion in theſe.

The French language is clogged with a difficulty in pronunciation from which moſt others are free; and it conſiſts in this, that moſt of their words have two different pronunciations, the one in common proſe, the other in verſe.

Pronunciation, is alſo uſed for the fifth and laſt part of rhetoric, which conſiſts in varying and regulating the voice agreeably to the matter and words, ſo as moſt effectually to perſuade and touch hearers.

It is much the ſame with what is otherwiſe called emphaſis.

PROOF, in arithmetic, an operation whereby the truth and juſtneſs of a calculation is examined and aſcertained.

The proper proof is always by the contrary rule: thus ſubtraction is the proof of addition, and multiplication of diviſion; and *vice verſa*.

Proof, in law, &c. denotes the mediums or arguments uſed to evince the truth of any thing.

Proof is alſo uſed in a ſynonymous ſenſe with ſtandard: thus we call that proof-ſpirit, which is of the ſtandard ſtrength, or half alcohol half phlegm.

PROPAGATION, *Propagatio*, the act of multiplying the kind, or of producing the like in the natural way of generation.

PROPER, *Proprium*, ſomething naturally and eſſentially belonging to any thing.

PROPERTY, *Proprietas*, in a general ſenſe, that which conſtitutes or denominates a thing proper; or it is a particular virtue or quality which nature has beſtowed on ſome things excluſive of all others: thus colour is a property of light; extenſion, figure, diviſibility, and impenetrability, are properties of body, &c.

Property, in law, is defined to be the higheſt right a perſon has, or can have, to any thing; it being uſed to denote that right which one has to lands or tenements, goods or chattels, in no reſpect depending upon another's courteſy.

PROPHECY, *προφητεια*, a prediction made by divine inſpiration.

Mr. Whiſton condemns all allegorical explanation of the prophecies of the old Teſtament cited in the New, as weak, enthuſiaſtic, &c. and adds, that if a double ſenſe of the prophecies be allowed, and there be no other method of ſhewing their completion than by applying them ſecondarily and typically to our Lord, after having been in their firſt and primary intention long ago fulfilled in the times of the Old Teſtament, we loſe all the real advantages of the antient prophecies as to the proof of chriſtianity. He therefore ſets up a new ſcheme in oppoſition thereto: he owns that taking the preſent text of the Old Teſtament for genuine, it is impoſſible to expound the apoſtles citations of the prophecies of the Old Teſtament on any other than the allegorical foundation; and therefore to ſolve the difficulty, he is forced to have recourſe to a ſuppoſition contrary to the ſenſe of all chriſtian writers before him, viz. that the text of the Old Teſtament has been greatly corrupted ſince the apoſtolical age by the Jews.

Perſons pretending to prophecies, are puniſhable at common law; by ſtatute, likewiſe, if any perſon publiſh ſuch prophecies with intent to raiſe ſedition, they ſhall forfeit 10l. for the firſt offence, and ſuffer a year's impriſonment; and for the ſecond, incur the forfeiture of all their goods, &c.

PROPHET, *προφητης*, in general, a perſon who foretels future events, but is particularly applied to ſuch inſpired perſons among the Jews as were commiſſioned by God to declare his will and purpoſes to that people. Among the canonical books of the Old Teſtament, we have the writings of ſixteen prophets, four of which are denominated the greater prophets, viz. Iſaiah, Jeremiah, Ezekiel, and Daniel, ſo called from the length or extent of their writings, which exceed thoſe of the others, viz. Hoſeah, Joel, Amos, Obadiah, Jonas, Micah, Nahum, Habakkuk, Haggai, Zachariah, and Malachi, who are called the leſſer prophets from the ſhortneſs of their writings. The Jews do not place Daniel among the prophets, becauſe they ſay he lived the life of a courtier rather than that of a prophet. An account of the ſeveral writings of the prophets may be ſeen each under its particular head.

PROPHYLACTICE, *προφυλακτικη*, in medicine, that part thereof which inſtructs as to the method of preſerving health and averting diſeaſes.

PROPITIATION, in theology, a ſacrifice offered to God to aſſwage his wrath, and render him propitious. Among the Jews there were both ordinary and public ſacrifices, as holocauſts, &c. offered by way of thankſgiving; and extraordinary ones, offered by particular perſons guilty of any crime, by way of propitiation.

The Romiſh church believe the maſs to be a ſacrifice of propitiation for the living and the dead. The reformed churches allow of no propitiation but that one offered by Jeſus Chriſt on the croſs. Protiation was alſo a feaſt among the Jews, celebrated on the tenth of the month Tiſri, in commemoration of the pardon proclaimed to their foreſathers by Moſes on the part of God, who thereby remitted the puniſhment due to the crime of their worſhipping the golden calf.

PROPITIATORY, or Mercy-Seat, among the Jews, was the cover or lid of the ark of the covenant. See Ark.

The cherubims ſpread their wings over the propitiatory.

PROPOLIS, the name of a certain ſubſtance more glutinous and tenacious than wax, with which the bees ſtop up all the holes or cracks in the ſides of their hives.

PROPORTION. When two quantities are compared one with another, in reſpect of their greatneſs or ſmalneſs, the compariſon is called ratio, reaſon, rate, or proportion: but when more than two quantities are compared, then the compariſon is more uſually called the proportion that they have to one another. The words ratio and proportion are frequently uſed promiſcuouſly.

When two quantities only are compared, the former term is called the antecedent, and the latter the conſequent.

The relation of two homogeneous quantities one to another, may be conſidered either, 1. By how much the one exceeds the other, which is called their difference. Thus 5 exceeds 3 by the difference 2. Or, 2. What part or parts one is of another, which is called ratio. Thus the ratio of 6 to 3 is $\frac{6}{3}=\frac{2}{1}$, or double; and the ratio of 3 to 6 is $\frac{3}{6}=\frac{1}{2}$, or ſubduple.

When two differences are equal, the terms that compoſe them are ſaid to be arithmetically proportional. Thus ſuppoſe the term to be a and b, their difference d. If a be the leaſt term, then $a+d=b$. And if a be the greateſt, then $a-d=b$.

But when two ratios are equal, the terms that compoſe them are ſaid to be geometrically proportional. For ſuppoſe a and b to be the terms of any ratio; if a be the leaſt term, put $r=\frac{b}{a}$, then $ar=b$ by equal multiplication: but if b be the leaſt term, put $r=\frac{a}{b}$ then $br=a$ by equal multiplication, and $\frac{a}{r}=b$ by equal diviſion.

Thus the ratio of two quantities, or of two numbers, in geometrical proportion, is found by dividing the antecedent by the conſequent, and the quotient is the exponent or denominator of the ratio.

Proportions, ſo many of them as are rational, or between number and number, have particular names given them by the Greek and Latin writers. Thus, if after the antecedent be divided by the conſequent, the quotient be 1, it is called proportion of equality, or ſimple proportion. If the quotient be 2, 3, 4, (or any other integral number) it is called multiple proportion (viz. double, triple, quadruple, &c.) and the contrary to thoſe are called ſub-multiple, (viz. ſub-duple, ſub-triple, ſub-quadruple, &c.) or one half, one third, one fourth, or other ſuch aliquot part.

If the quotient be 1, with one ſuch part, as $1\frac{1}{2}$, $1\frac{1}{3}$, $1\frac{1}{4}$, &c. it is called ſuper-particular (viz. ſeſquialteral, ſeſquitertian, ſeſquiquartan, &c.) and the contraries hereunto are called ſub-ſuperparticular (viz. ſub-ſeſquialteral, ſub-ſeſquitertian, &c.)

If ſuch quotient be 2, 3, 4, (or ſuch other integer greater than unity) with ſuch an aliquot part it is called multiple-ſuperparticular (as $2\frac{1}{2}$ duple-ſeſquialteral, $3\frac{1}{3}$ triple-ſeſquitertian, $3\frac{1}{4}$ triple-ſeſquiquartan, &c.) and the contraries thereunto are ſub-multiple-ſuperparticular, as ſubduple-ſeſquialteral, ſubtriple-ſeſquitertian, &c.

If the quotient be 1, with ſome number of aliquot parts, as $1\frac{2}{3}$, $1\frac{3}{4}$, $1\frac{2}{5}$, &c. it is called ſuperpartient, (as ſuperbipartiens tertias, ſupertripartiens quartas, ſuperbipartiens quintas, &c.) and the contraries hereunto are ſub-ſuperpartient, as ſub-ſuperbipartiens tertias, &c.

If ſuch quotient be ſome greater integer number, (as 2, 3, &c.) with ſuch number of aliquot parts, as $2\frac{2}{3}$, $3\frac{3}{4}$, $3\frac{2}{5}$, &c. it is called multiple-ſuperpartiens, (as dupla-ſuperbipartiens tertias, tripla-ſupertripartiens quartas, tripla-ſupertripartiens quintas, &c.) And the contraries thereunto, ſubmultiple-ſuperpartient (as ſubdupla-ſuperbipartiens tertias, ſubtripla-ſupertripartiens quartas, &c.) as that of 31 to 7 (becauſe $\frac{31}{7}=4\frac{3}{7}$) is quadruple-ſupertripartiens ſeptimas; and its contrary, 7 to 31, is ſub-quadruple-ſupertripartiens ſeptimas. And under ſome of theſe compellations all proportions will fall, which are as one integer number to another.

But it is much better, and more intelligible, to expreſs theſe proportions, as the uſual manner now is, by the numbers themſelves, than by theſe names, as 31 to 7, or 7 31.

If when four quantities are conſidered, you find that the firſt hath as much greatneſs or ſmalneſs in reſpect to the ſecond, as the third hath in reſpect to the fourth: thoſe four quantities are called proportionals, and are thus expreſſed:

As $\left\{\begin{array}{c} A : B :: C : D \\ \hline 8 : 2 :: 16 : 4 \end{array}\right\}$ that is, as $A=8$ contains $B=2$ four times, ſo $C=16$ contains $D=4$ four times; and therefore A has the ſame ratio to B, as C has to D; and conſequently, theſe four quantities having equal ratios, are proportionals.

Proportion conſiſts of three terms at leaſt, whereof the ſecond ſupplies the place of two.

When three magnitudes, A, B, C, are proportional, the firſt A has a duplicate ratio to the third C, of that it hath to the ſecond B: but when four magnitudes, A, B, C, D, are proportional, the firſt A has a triplicate ratio to the fourth D, of what it has to the ſecond B; and ſo always in order one more, as the proportion ſhall be extended.

Duplicate ratio is thus expreſſed, $\frac{A}{C}=\frac{A}{B}$ twice; that is, the ratio of A to C is duplicate of the ratio of A to B. For let $A=2$, $B=4$, $C=8$; then the ratio of 2 to 8, is duplicate of the ratio of $2=A$ to $B=4$, or as the ſquare of 2 to the ſquare of 4.

Triplicate ratio is thus expreſſed, $\frac{A}{D}=\frac{A}{B}$ thrice; that is, the ratio of A again $=2$, to $D=16$, is triplicate of the ratio of $A=2$, to $B=4$, or as 8 the cube of 2, to 64 the cube of 4. Wherefore duplicate ratio is the proportion of ſquares, and triplicate that of cubes.

And the ration of 2 to 8, is compounded of the ratio of that of 2 to 4, and of 4 to 8. From what has been ſaid of the nature of ratio and proportion, the ſix ways of arguing, which are often uſed by mathematicians, will evidently follow.

1. Alternate proportion, is the comparing of antecedent to antecedent, and conſequent to conſequent. As if $\left\{\begin{array}{c} A : B :: C : D \\ 2 : 4 :: 8 : 16 \end{array}\right\}$ therefore alternately, or by permutation, as $\left\{\begin{array}{c} A : C :: B : D \\ 2 : 8 :: 4 : 16 \end{array}\right\}$.

2. Inverſe ratio, is when the conſequent is taken as the antecedent, and ſo compared to the antecedent as the conſequent. As $A : B :: C : D$; therefore inverſly, as $\left\{\begin{array}{c} B : A :: D : C \\ 4 : 2 :: 16 : 8 \end{array}\right\}$.

3. Compound ratio, is when the antecedent and conſequent, taken both as one, are compared to the

conſequent itſelf. As A : B : : C : D; therefore by compoſition, as A + B : B : : C + D : D; in numbers, as 2 + 4 = 6, is to 4 : : ſo is 8 + 16 = 24, to 16.

4. Divided ratio, is when the exceſs wherein the antecedent exceedeth the conſequent, is compared to the conſequent. As A : B : : C : D; therefore by diviſion, A — B : B : : C — D : D; in numbers, as 16 : 8 : : 12 : 6; therefore as 16 — 8 = 8, is to 8, ſo is 12 — 6 = 6 to 6.

5. Converſe ratio, is when the antecedent is compared to the exceſs wherein the antecedent exceeds the conſequent. As A : B : : C : D; therefore by converſe ratio, as A : A — B : : C : C — D; in numbers thus, as 16 : 16 — 8 = 8 : : 12 : 12 — 6 = 6.

6. Proportion of equality, is where there are taken more quantities than two in one order, and alſo as many quantities in another order, comparing two to two being in the ſame ratio: it follows, that as in the firſt order of quantities, the firſt is to the laſt, ſo in the ſecond order of quantities, is the firſt to the laſt: or otherwiſe it is compariſon of the extremes together, the mean quantities being omitted. Thus let A, B, C, be three quantities, and D, E, F, three others, and taking them two by two, let them be in the ſame proportion; that is, let A : B : : D : E, and B : C : : E : F; now if it be inferred that A, the firſt of the firſt order, is to C the laſt, as D the firſt of the ſecond order, is to F the laſt, this form of arguing is ſaid to be *ex equo*, or from equality. In numbers, let 16 : 8 : 4 and 12 : 6 : 3 be in the ſame proportion when taken two by two; that is, as 16 : 8 : : 12 : 6, and as 8 : 4 : : 6 : 3; now if 16 in the firſt order be to 4 the laſt, as 12 the firſt of the ſecond order is to three the laſt, this is called proportion of equality.

7. Ordinate proportion is, when antecedent is to conſequent, as antecedent is to conſequent; and as the conſequent is to any other, ſo is the conſequent to any other: as

when $\left\{\begin{matrix} A:B::D:E \\ 12:3::8:2 \end{matrix}\right\}$ alſo $\left\{\begin{matrix} B:C::E:F \\ 3:9::2:6 \end{matrix}\right\}$ andthen it ſhall be $\left\{\begin{matrix} A:C::D:F \\ 12:9::8:6 \end{matrix}\right\}$.

8. Perturbate proportion, is when three magnitudes being put, and others alſo which are equal to theſe in multitude, as in the firſt magnitudes the antecedent is to the conſequent, ſo in the ſecond magnitudes is the antecedent to the conſequent: and as in the firſt magnitudes the conſequent is to any other, ſo in the ſecond magnitudes is any other to the antecedent.

Thus if $\left\{\begin{matrix} A,\ B,\ C \\ 16,\ 8,\ 4 \end{matrix}\right\}$ and $\left\{\begin{matrix} E,\ F,\ G \\ 12,\ 6,\ 3 \end{matrix}\right\}$ are two ſets of magnitudes, if $\left\{\begin{matrix} A:B::F:G \\ 16:8::6:3 \end{matrix}\right\}$ and $\left\{\begin{matrix} B:C::E:F \\ 8:4::12:6 \end{matrix}\right\}$ this is called perturbate proportion, and by the 23, 5 Eucl. it ſhall be as $\left\{\begin{matrix} A:C::E:G \\ 16:4::12:3 \end{matrix}\right\}$.

In the foregoing caſes, the product of the means is equal to that of the extremes, and therefore the quantities are proportionals.

When of ſeveral quantities the difference or quotient of the firſt and ſecond is the ſame with that of the ſecond and third, they are ſaid to be in a continued arithmetic or geometric proportion.

Thus, $\left\{\begin{matrix} a,\ a+d,\ a+2d,\ a+3d,\ a+4d, \\ a,\ a-d,\ a-2d,\ a-3d,\ a-4d, \end{matrix}\right\}$ &c. is a ſeries of continued arithmetical proportionals, whoſe common difference is d.

And $\left\{\begin{matrix} a,\ ar,\ arr,\ arrr,\ arrrr,\ ar^5, \\ a,\ \frac{a}{r},\ \frac{a}{rr},\ \frac{a}{rrr},\ \frac{a}{rrrr},\ \frac{a}{r^5}, \end{matrix}\right\}$ &c. is a ſeries of continued geometrical proportionals, whoſe common multiplier is $\frac{r}{1}$, or $\frac{1}{r}$, or whoſe ratio is that of 1 to r, or r to 1.

Note, that this ſign ÷ ſignifies continued proportion.

Again, when of ſeveral quantities the difference or quotient of the 1ſt and 2d, is the ſame with that of the 3d and 4th (and not of the 2d and 3d) they are ſaid to be in a diſcontinued arithmetic or geometric proportion; ſuch as

1. $\left\{\begin{matrix} a,\ a+d;\ e,\ e+d \\ a+d,\ a;\ e+d,\ e \end{matrix}\right\}$ for $\left\{\begin{matrix} \overline{a+d}-a=\overline{e+d}-e \\ =d. \end{matrix}\right.$

2. $\left\{\begin{matrix} a,\ ar;\ e,\ er; \\ ar,\ a;\ er,\ e; \end{matrix}\right\}$ for $\left\{\begin{matrix} \frac{a}{ar}=\frac{e}{er}=\frac{1}{r} \\ \frac{ar}{a}=\frac{er}{e}=\frac{r}{1} \end{matrix}\right\}$

Harmonic PROPORTION, is when three terms are ſo diſpoſed, that as the diff. of the firſt and ſecond : the diff. of the ſecond and third : : firſt : third; and they are ſaid to be harmonically proportional.

Thus 10, 15, 30, are harmonically proportional. For as the diff. of 10 and 15, is to the diff. of 15 and 30, ſo is 10 to 30. Alſo 12, 6, 4, are harmonically proportional; for 12 — 6 : 6 — 4 : : 12 : 4. So $b^2+3bn+2n^2$ b^2+2bn, b^2+bn, are harmonically proportional. For $bn+2n^2 : bn :: b^2+3bn+2n^2 : b^2+bn$. Whence if the two firſt terms of an harmonic proportion be given, the third is readily found.

For if A, B, C, be harmonically proportional, then A — B : B — C : : A : C, and AC — BC = AB — AC; therefore AB = 2A — B × C, and BC = 2C — B × A. Conſequently $C=\frac{AB}{2A-B}$ and $A=\frac{BC}{2C-B}$. Again, when four terms are ſo diſpoſed, that as the diff. of the 1ſt and 2d : the diff. of the 3d and 4th : : 1ſt : 4th, they are alſo harmonically proportional. As 10, 16, 24, 60; for as 10 — 16 : 24 — 60 :: 10 : 60. Whence, if the three firſt terms of ſuch an harmonic proportional be given, the 4th is eaſily found.

For if a, b, c, d, be harmonical proportionals, then $a - b : c - d :: a : d$; and $ad - bd = ac - ad$; therefore $d = \frac{ac}{2a-b}$, and $a = \frac{bd}{2d-c}$.

If the terms of an harmonic proportion be continued, then it is called an harmonical progreſſion. Thus, ſuppoſing

$\left\{ \begin{array}{l} b, \text{ to be the ſecond term,} \\ d, \text{ the difference of the firſt and ſecond,} \end{array} \right\}$

and that the firſt exceeds the ſecond; the progreſſion will be $b + d$, b, $\frac{b^2+bd}{b+2d}$, $\frac{b^2+bd}{b+3d}$, $\frac{b^2+bd}{b+4d}$, $\frac{b^2+bd}{b+5d}$, &c.

Whence, if out of a rank of harmonic proportionals, there be taken any ſeries of equidiſtant terms, that ſeries will be harmonically proportional. And this kind of proportion has ſeveral other properties common with arithmetic and geometric proportions.

When three terms are ſo diſpoſed, that, the diff. of the 1ſt and 2d : diff. of the 2d and 3d :: 3d : 1ſt, they are ſaid to be in a contra-harmonic proportion. Thus, 6, 5, 3, and 12, 10, 4, are contra-harmonics. For, 6 — 5 : 5 — 3 :: 3 : 6; and 12 — 10 : 10 — 4 :: 4 : 12. Or, ſuppoſing b greater than n, if the ſecond term be greater that the 1ſt;

Then $bn + n^2$, $b^2 + n^2$, $b^2 + bn$, are contra-harmonics, for $bn - b^2 : n^2 - bn :: b^2 + bn : bn + n^2$.

But, if the 1ſt term exceeds the 2d, then, $b^2 + bn$, $b^2 + n^2$, $bn + n^2$, are contra-harmonics; for $bn^2 - n^2 : b^2 - bn :: bn + n^2 : b^2 + bn$.

PROPOSITION, *Propoſitio*, in logic, part of an argument wherein ſome quality, either negative or poſitive, is attributed to a ſubject; or, according to Chauvinus, it is a complete conſiſtent ſentence, indicating or expreſſing ſomething either true or falſe, without ambiguity; as, God is juſt.

PROPOSITION, in mathematics, is either ſome truth advanced and ſhewn to be ſuch by demonſtration, or ſome operation propoſed and its ſolution ſhewn. If the propoſition be deduced from ſeveral theoretical definitions compared together, it is called a theorem; if from a praxis, or ſeries of operations, it is called a problem.

PROPOSITION, in poetry, the firſt part of a poem wherein the author propoſes briefly, and in general what he is to ſay in the body of his work. It ſhould comprehend only the matter of the poem, that is the action and the perſons that act. Horace preſcribes modeſty and ſimplicity in the propoſition, and would not have the poet promiſe too much, nor raiſe in the reader too great ideas of what he is going to relate.

PROPRETOR, a Roman magiſtrate, who, having diſcharged the office of pretor at home, was ſent into a province to command there with his former pretorial authority. It was alſo an appellation given to thoſe who, without having been pretors at Rome, were ſent extraordinarily into the provinces to adminiſter juſtice with the authority of pretors.

PROPRIETOR, or proprietary, he who has the property of any thing.

PROPRIETY, in grammar, is where the direct and immediate ſignification of a word agrees to the thing it is applied to; in which ſenſe, it is uſed in oppoſition to figurative, or remote ſignification.

PRO RATA, in commerce, a term ſometimes uſed by merchants for, in proportion: as each perſon muſt reap the profit or ſuſtain the loſs pro rata to his intereſt, that is, in proportion to his ſtock.

PROSCRIPTION, *Proſcriptio*, a publication made in the name of the chief or leader of a party, whereby he promiſes a reward to any one who ſhall bring him the head of one of his enemies.

PROSE, *Proſa*, the natural language of mankind, looſe and unconfined by poetical meaſures, rhymes, &c. in which ſenſe it ſtands oppoſed to verſe.

PROSECUTOR, in law, he that purſues a cauſe in another's name.

PROSELYTE, a new convert to ſome religion or religious ſect. See CONVERT.

PROSERPINACA, in botany, a genus of plants, whoſe flower is apetulous; the cup is divided into three erect, acuminated, perſiſtent, ſegments; and contains three ſubulated patent filaments, top'd with oblong, acute, double antheræ: there is no pericarpium, but the cup contains one oſſeous, ovate, three cornered ſeed.

PROSODY, *Proſodia*, that part of grammar which treats of the quantities and accents of ſyllables, and the manner of making verſes.

The Engliſh proſody turns chiefly on two things, numbers, and rhyme.

PROSONOMASIA, προςονοαςια, a figure in rhetoric, whereby alluſion is made to the likeneſs of a ſound in ſeveral names or words.

PROSOPOPOEIA, ϖροςοποποια, a figure in rhetoric, whereby we raiſe qualities, or things inanimate, into perſons. This figure is divided into two parts: 1. when good and bad qualities, accidents, and things inanimate, are introduced as living and rational beings; as in the following verſes of Milton:

- - - - - - - Now gentle gales,
Fanning their odoriferous wings, diſpenſe
Native perfumes; and whiſper whence they ſtole
Thoſe balmy ſpoils.- - - - - - - -

The ſecond part of this figure is when we give a voice to inanimate things, and make rocks, woods, rivers, buildings, &c. expreſs the paſſions of rational creatures, as in the followng lines of Spencer.

She foul blaſphemous ſpeeches forth did caſt,
And bitter curſes, horrible to tell,
That ev'n the temple wherein ſhe was plac'd,
Did quake to hear, and nigh aſunder burſt!

PROSTATÆ, in anatomy, a gland, generally ſuppoſed to be two ſeparate bodies, though in reality but one, of a roundiſh, or ſomewhat heart faſhioned ſhape, ſituated juſt before the neck of the bladder, and ſurrounding the beginning of the urethra.

PROSTHAPHÆRESIS, ϖροσθαφαιρησις, in aſtronomy, the difference between the true and mean motion, or true and mean place of a planet, called alſo equation of the orbit, or of the center, and ſimply equation.

Proſthaphæreſis amounts to the difference between the mean and equated anomaly.

PROSTHESIS, in grammar, the prefixing ſome letter or ſyllable at the beginning of a word, as in *gnatus*, for *natus*, &c.

Prosthesis, among ſurgeons, is the ſupplying that which is deficient by the appoſition of new matter, as the filling up ulcers, wounds, &c. with new fleſh.

PROSTYLE, in antient architecture, a range of columns in the front of a temple.

PROTASIS, in the antient drama, the firſt part of a comic or tragic piece, wherein the ſeveral perſons are ſhewn, their characters intimated, and the ſubject of the piece propoſed and entered upon.

PROTECTION, the ſhelter, defence, authority, and aid, employed by any one in behalf of another.

PROTECTOR, a perſon who undertakes to ſhelter and defend the weak, helpleſs and diſtreſſed.

PROTEST, in law, is a call of witneſs, or an open affirmation that a perſon does either not all, or but conditionally, yield his conſent to any act, or to the proceeding of any judge in a court in which his juriſdiction is doubtful; or to anſwer upon his oath farther than he is bound by law.

Protest, in commerce, is a ſummons wrote by a notary public to a merchant, banker, or the like, to accept or diſcharge a bill of exchange drawn on him, after his having refuſed either to accept or pay it.

PROTESTANT, a name firſt given in Germany to thoſe who adhered to the doctrine of Luther; becauſe in 1529, they proteſted againſt a decree of the emperor Charles V. and the diet of Spires; declaring that they appealed to a general council. The ſame name has alſo been given to thoſe of the ſentiments of Calvin, and is now become a common denomination for all thoſe of the reformed churches.

PROTHONOTARY, a term which properly ſignifies firſt notary, and which was anciently the title of the principal notaries of the emperors of Conſtantinople.

PROTHYRIS, in the antient architecture, is ſometimes uſed for a quoin or ſtone in the corner of a wall, and ſometimes for a croſs beam or rafter. Prothyris is alſo uſed by Vignola for a particular ſort of key of an arch, an inſtance of which is found in the Ionic order: it conſiſts of a roll of water-leaves between two reglets and two fillets, crowned with a Doric cymatium; its figure greatly reſembling that of a modillion.

PROTHYRUM, in architecture, a porch at the outer door of a houſe.

PROTO-TYPE, is the original or model after which a thing was formed; but chiefly uſed for the patterns of things to be engraved, caſt, &c.

PROTRACTION, in ſurveying, the ſame with plotting. See Plotting and Protractor.

PROTRACTOR, in ſurgery, a kind of forceps, ſo called from extracting foreign bodies out of wounds.

Protractor is alſo the name of an inſtrument uſed for protracting or laying down on paper the angles of a field, or other figure.

The protractor is a ſmall ſemi-circle (plate LXXVI. fig. 13.) of braſs, or other ſolid matter; the limb or circumference of which is nicely divided into 180 degrees: it ſerves not only to draw angles on paper, or any plane, but alſo to examine the extent of thoſe already laid down. For this laſt purpoſe, let the ſmall point, A, in the center of the protractor, be placed above the angular point, and let the ſide AB coincide with one of the ſides that contain the angle propoſed: then the number of degrees cut off by the other ſide, computing on the protractor from B, will ſhew the quantity of the angle that was to be meaſured.

But when any angle is to be made of a given quantity, ſuppoſe 40°, on a given line AB (ibid. fig. 14.) and at a given point of that line A; upon this point apply the center A of the protractor, in ſuch a manner that the ſide AB of the protractor, may coincide with the given line AB; then let a dot or mark be made at the given number of degrees on the limb, viz. 40°, at C, and a right line drawn from C to A, will form an angle CAB =40°, as is manifeſt.

This is the moſt natural and eaſy method either of examining the extent or quantity of an angle, or for deſcribing an angle of any quantity required. But when a protractor is wanting, the ſame may be done by means of a line of chords: thus to lay down the foreſaid angle CAB by a line of chords, take 60° on the ſaid line in your compaſſes, and from the center A deſcribe an arch DE, which you imagine will be more than 40°, then taking the giving number of degrees, viz. 40°, in your compaſſes from the line of chords, and ſetting one foot in D, the point where AB produced interſects the arch DE, make a ſmall ſweep cutting the former arch in E; and, laſtly, join the points A and E eitherwholly or in part as far as C, and the angle EAB or CAB=40°, as is manifeſt.

When an obtuſe angle is required to be laid down or meaſured, let its complement to a ſemi-circle be meaſured, and thence the obtuſe angle will be found, and may be laid down as directed above.

There is commonly annexed to this inſtrument, a fine needle fitted into a handle, and called a protracting pin; the uſe of which is to prick off degrees and minutes from the limb of the protractor.

PROTUBERANCE, in anatomy, is any eminence, whether natural or preternatural, that projects or advances out beyond the reſt.

PROVERB, according to Cambden, is a conciſe, witty, and wiſe ſpeech, grounded upon experience, and for the moſt part containing ſome uſeful inſtruction.

Book of PROVERBS, a canonical book of the Old-Teſtament, containing a part of the proverbs of Solomon, the ſon of David, king of Iſrael. The firſt twenty-four chapters are acknowledged to be the genuine work of that prince; the next five chapters are a collection of ſeveral of his proverbs, made by order of king Hezekiah; and the two laſt ſeem to have been added, though belonging to different and unknown authors, Agur the ſon of Jakeh, and king Lemuel.

In this excellent book are contained rules for the conduct of all conditions of life; for kings, courtiers, maſters, ſervants, fathers, mothers, children, &c.

PROVIDENCE, the conduct and direction of the ſeveral parts of the univerſe, by a ſuperior intelligent being.

Nuns of PROVIDENCE, a community of young women at Paris, who make two vows, viz. of chaſtity and obedience.

They are habited in black, and board young ladies who chooſe to be educated among them.

PROVINCE, in geography, a diviſion of a kingdom or ſtate, compriſing ſeveral cities, towns, &c. all under the ſame government, and uſually diſtinguiſhed by the extent either of the civil or eccleſiaſtical juriſdiction.

The church diſtinguiſhes its provinces into archbiſhoprics; in which ſenſe, England is divided into two provinces, viz. Canterbury and York.

United PROVINCES, are the ſeven northern provinces of the low countries, who, revolting from the Spaniſh dominion, made a perpetual alliance, offenſive and defenſive, at Utrecht, anno 1579.

PROVINE, a branch of a vine laid in the ground to take root and propagate.

PROVISO, in law, a condition inſerted in a deed, upon the obſervance whereof the validity of the deed depends.

PROVOCATIVE, in phyſic, a medicine which is ſuppoſed to ſtrengthen nature, and incites to venery.

PROVOST, *Præpoſitus*, an officer, whereof there are divers kinds, civil, military, &c.

PROW, *Prora*, in navigation, denotes the head or fore-part of a ſhip, particularly in a galley, being that which is oppoſite to the poop or ſtern. See the article SHIP.

PROXENETA, or PROXENETES, a kind of broker or agent, who tranſacts between two perſons.

It is chiefly applied to thoſe who negotiate marriages, &c.

PROXIMITY, *Proximitas*, denotes the relation of nearneſs, either in reſpect of place, blood, or alliance.

PROXY, *Procurator*, a perſon who officiates as a deputy in the room of another.

PRUNELLA, in botany, a genus of plants, whoſe flower is monopetalous and ringent; the tube is ſhort and cylindric; the upper lip is concave and intire, and the under one is reflexed, trifid, and obtuſe, the middle edge of which is broader, emarginated, and ſerrated: the ſeeds are four in number, of an oval figure, and contained in a bilabiated cup.

Sal PRUNELLÆ, in pharmacy, a preparation of purified ſalt-petre, called alſo cryſtal mineral.

PRUNES, in commerce, are plums dried in the ſunſhine, or in an oven.

PRUNIFEROUS TREES, thoſe with pretty large and fleſhy fruit, with a nucleus in the middle, and called by botaniſts a drupe.

PRUNING, in gardening and agriculture, is the lopping off the ſuperfluous branches of trees, in order to make them bear better fruit, grow higher, or appear more regular.

Pruning, though an operation of very general uſe, is nevertheleſs rightly underſtood by few; nor is it to be learned by rote, but requires a ſtrict obſervation of the different manners of growth of the ſeveral ſorts of fruit-trees; the proper method of doing which cannot be known without carefully obſerving how each kind is naturally diſpoſed to produce its fruit: for ſome do this on the ſame year's wood, as wines; others, for the moſt part, upon the former years wood, as peaches, nectarines, &c. and others upon ſpurs which are produced upon wood of three, four, &c. to fifteen or twenty years old, as pears, plumbs, cherries, &c. therefore, in order to the right management of fruit trees, proviſion ſhould always be made to have a ſufficient quantity of bearing wood in every part of the trees, and at the ſame time there ſhould not be a ſuperfluity of uſeleſs branches which would exhauſt the ſtrength of the trees, and cauſe them to decay in a few years.

The reaſons for pruning of fruit-trees; are, 1. To preſerve them longer in a vigorous bearing ſtate; 2.

2. To render them more beautiful; and, 3. To cauſe the fruit to be larger and better taſted.

The general inſtructions for pruning are as follow: the greateſt care ought to be taken of fruit-trees in the ſpring, when they are in vigorous growth, which is the only proper ſeaſon for procuring a quantity of good wood in the different parts of the tree, and for diſplacing all uſeleſs branches as ſoon as they are produced, in order that the vigour of the tree may be entirely diſtributed to ſuch branches only as are deſigned to remain. For this reaſon trees ought not to be neglected in April and May, when their ſhoots are produced: however thoſe branches which are intended for bearing the ſucceeding year ſhould not be ſhortened during the time of their growth, becauſe this would cauſe them to produce two lateral ſhoots from the eyes below the place where they were ſtopped, which would draw much of the ſtrength from the buds of the firſt ſhoot: and if theſe two lateral ſhoots are not entirely cut away at the winter-pruning, they will prove injurious to the tree. This is to be chiefly underſtood of ſtone-fruit and grapes; but pears and apples, being much harder, ſuffer not ſo much, thouhg it is a great diſadvantage to thoſe alſo to be thus managed. It muſt likewiſe be remarked, that peaches, nectarines, apricots, cherries, and plumbs, are always in the greateſt vigour when they are leaſt maimed by the knife, for where large branches are taken off, they are ſubject to gum and decay; it is therefore the moſt prudent method to rub off all uſeleſs buds when they are firſt produced, and to pinch others where new ſhoots are wanted to ſupply the vacancies of the wall; by which management they may be ſo ordered as to want but little of the knife in winter pruning. The management of pears and apples is much the ſame with theſe trees in ſummer; but in winter they muſt be very differently pruned: for as peaches and nectarines, for the moſt part, produce their fruit upon the former year's wood, and muſt therefore have their branches ſhortened according to their ſtrength, in order to produce new ſhoots for the ſucceeding year; ſo on the contrary, pears, apples, plumbs, and cherries, producing their fruit upon ſpurs, which come out of the wood of five ſix and ſeven years old, ſhould not be ſhortened, becauſe thereby thoſe buds which were naturally diſpoſed to form theſe ſpurs, would produce wood branches; by which means the trees would be filled with wood, but would never produce much fruit. The branches of ſtandard trees ſhould never be ſhortened unleſs where they are very luxuriant, and by growing irregularly on one ſide of the tree, attract the greateſt part of the ſap, by which means the other parts are either unfurniſhed with branches, or are rendered very weak; in which caſe the branch ſhould be ſhortened down as low as is neceſſary, in order to obtain more branches to fill up the hollow of the tree: but this is only to be underſtood of pears and apples, which will produce ſhoots from wood of three, four, or more years old; whereas moſt ſorts of ſtone-fruit will gum and decay after ſuch amputations: whenever this happens to ſtone-fruit it ſhould be remedied by ſtopping or pinching thoſe ſhoots in the ſpring, before they have obtained too much vigour, which will cauſe them to puſh out ſide branches; but this muſt be done with caution. You muſt alſo cut out all dead or decaying branches, which cauſe their heads to look ragged and alſo attract noxious particles from the air in doing of this you ſhould cut them cloſe down to the place where they were produced, otherwiſe that part of the branch which is left will alſo decay, and prove equally hurtful to the reſt of the tree; for it ſeldom happens when a branch begins to decay, that it does not die quite down to the place where it was produced, and if permitted to remain long uncut often infects ſome of the other parts of the tree. If the branches cut off are large, it will be very proper, after having ſmoothed the cut part exactly even with a knife, chiſſel, or hatchet, to put on a plaſter of grafting clay, which will prevent the wet from ſoaking into the tree at the wounded part. All ſuch branches as run a-croſs each other, and occaſion a confuſion in the head of the tree ſhould be cut off; and as there are frequently young vigorous ſhoots on old trees which riſe from the old branches near the trunk, and grow upright into the head, theſe ſhould be carefully cut out every year, leſt, by being permitted to grow, they fill the tree too full of wood. For pruning the roots and branches of trees in tranſplanting them, ſee the article PLANTING.

As to the pruning of foreſt-trees, if they be large it is beſt not to prune them at all; yet if there be an abſolute neceſſity, avoid taking off large boughs as much as poſſible. And, 1. If the bough be ſmall, cut it ſmooth, cloſe, and ſloping. 2. If the branch be large and the tree old, cut it off at three or four feet from the ſtem. 3. If the tree grow crooked, cut it off at the crook ſloping upward, and nurſe up one of the moſt promiſing ſhoots for a new ſtem. 4. If the tree grow top-heavy, its head muſt be lightened, and that by thinning the boughs that grow out of the main branches. But if you would have them ſpring, rub off the buds, and ſhroud up the ſide-ſhoots. 5. If the ſide bough ſtill breaks out, and the top be able to ſuſtain itſelf, give the boughs that put forth in ſpring a pruning after Midſummer, cutting them cloſe.

PRUSSIAN BLUE, among painters, &c. an animal-colour, prepared thus: take of crude tartar and nitre each four ounces; pulverize and mix them together, and, by decrepitation, bring them to a fixed ſalt; which being powdered hot, add to it four ounces of thoroughly dried ox-blood, reduced to a fine powder: calcine the mixture in a cloſe crucible, whereof it may fill two thirds:

then lightly grind the matter in a mortar, and throw it hot into two quarts of boiling water; boil them together for half an hour, and afterwards ſtraining off the liquor, waſh the remaining black ſubſtance with freſh water, and ſtrain as before, continuing to do this till the water poured off becomes inſipid: put the ſeveral liquors together, and evaporate them to two quarts. Next, diſſolve an ounce of green vitriol, firſt calcined to whiteneſs, in ſix ounces of rain-water, and filtre the ſolution: diſſolve alſo half a pound of crude alum in two quarts of boiling water; and add this to the ſolution of vitriol, taken hot from the fire, pouring to them likewiſe the firſt lixivium, whilſt thoroughly hot in a large veſſel; a great ebullition and a green colour will immediately enſue; whilſt this ebullition continues, pour the mixture out of one veſſel into another, and afterwards let it reſt; then ſtrain the liquor through a linen cloth, and let the matter or pigment remain in the ſtrainer, from whence put it, with a wooden ſpatula, into a ſmall new pot; pour upon it two or three ounces of ſpirit of ſalt, and a beautiful blue colour will immediately appear. Let the matter be now well ſtirred, then ſuffered to reſt for a night; afterwards thoroughly edulcorate it by repeated effuſions of rain-water, allowing a proper time for the precipitate to ſubſide; and being drained in a linen-ſtrainer, and gently dried, it at laſt becomes the pigment called Pruſſian blue, of an exquiſite colour.

PSALM, ψαλμος, a divine ſong or hymn; but chiefly appropriated to the hundred and fifty Pſalms of David, a canonical book of the old Teſtament.

Moſt of the Pſalms have a particular title, ſignifying either the name of the author, the perſon who was to ſet it to muſic or ſing it, the inſtrument that was to be uſed, or the ſubject and occaſion of it. Some have imagined, that David was the ſole author of the Book of Pſalms; but the titles of many of them prove the contrary, as Pſalm xix. which appears to have been written by Moſes. Many of the Pſalms are inſcribed with the names Korah, Jeduthun, &c. from the perſons who were to ſing them. Pſalm lxxii. and cxxvii. are under the name of Solomon; the former being compoſed by David for the uſe of his ſon, and the latter being probably compoſed by Solomon himſelf.

The authority and canonicalneſs of the book of Pſalms has always been acknowledged, both by Jews and Chriſtians. However nothing can be a greater argument of its obſcurity than the great number of commentaries upon them.

PSALMODY, ψαλμωδια, the art or act of ſinging pſalms.

PSALTER, ψαλτηριον, the ſame with the Book of Pſalms.

PSALTERY, ψαλτηριον, a muſical inſtrument, much in uſe among the antient Hebrews, who called it nebel.

PSIDIUM, the GUAVA, in botany, a genus of plants, whoſe flower conſiſts of five ovate, concave patent petals, inſerted in a companulated cup; he filaments are numerous, ſhorter than the petals and topped with ſmall antheræ; the fruit is a very large oval berry, crowned with the cup, and contains one cell, which includes a great number of ſmall ſeeds.

This genus grows in both Indies, the fruit of which is much eaten by the inhabitants of thoſe parts: it is very aſtringent, and nearly of the ſame quality with the pomegranate, ſo ſhould be avoided by thoſe perſons who are ſubject to be coſtive.

PSOAS, in anatomy, the name of two muſcles, diſtinguiſhed by the epithets magnus and parvus. The pſoas magnus is one of the flexor muſcles of the thigh, and ariſes from the firſt, ſecond, third, and fourth verteberæ of the loins. The pſoas parvus is one of the flexor-muſcles of the loins, which ariſes by a ſlender tendon from the os pubis, where it is joined to the illium; and is inſerted into the ſide of the upper vertebræ of the loins; it is often wanting, and when found, its office is to aſſiſt the quadratus in elevating the oſſa innominata, eſpecially when we lie down.

PSORALEA, in botany, a genus of plants, producing papilionaceous pentapetalous flowers; the vexillum is roundiſh and emarginated, the wings are lunulated, obtuſe, and ſmall, and the carina is dipetalous, moon-ſhaped, and obtuſe; the fruit is a compreſſed pointed pod, and contains one kidney ſhaped ſeed.

PSYCHOTRIA, in botany, a genus of plants, whoſe flower is monopetalous and ſaucer-ſhaped, and contains five hairy filaments topped with linear antheræ; the fruit is a roundiſh unilocular berry crowned with the cup, and includes two ovate ſeeds, convex on one ſide, with five furrows, and flat on the other.

PSYCHROMETER, an inſtrument for meaſuring the degrees of coldneſs or heat in the air, and more uſually called thermometer. See THERMOMETER.

PSYLLIUM, FLEA-WORT, in botany, is comprehended by Linnæus among the plantains. See the article PLANTAIN.

The ſeeds of pſyllium are recommended in the dyſentery and corroſion of the inteſtines. See the article DYSENTERY.

PTARMICA, SNEEZE-WORT, in botany, a genus of plants, producing compound radiated flowers; the florets which form the diſc, are tubuloſe and hermaphrodite, and the corollulæ which compoſe the rays, are female, ligulated an trifid; the ſtamina are five very ſhort filaments, topped with cylindric tubuloſe antheræ; and the ſeeds, which are oval, are contained in an oblong imbricated cup.

This genus is included by Linnæus among the achillea, which ſee; the common ptarmica grows wild in ſhady places, in many parts of England:

in the ſpring, the young tender ſhoots of it is put into ſallads by ſome people, to correct the coldneſs of the other herbs; the leaves when dried and reduced to powder make a good ſternutatory, and the roots are uſed to eaſe the pains occaſioned by the tooth-ach.

PTELEA, SHRUB-TREFOIL, in botany, a genus of plants, whoſe flower conſiſts of four ovato-lanceolate, plane, patent petals, with four ſubulated filaments, topped with roundiſh antheræ; the fruit is a roundiſh membrane, placed perpendicularly, with a cavity in the middle containing one obtuſe ſeed.

PTERIS, FEMALE-FERN, in botany. See the article FERN.

PTERONIA, in botany, a genus of plants, whoſe flower is compound and uniform, the proper flowers, are hermaphrodite, funnel-ſhaped, and cut into five acute ſegments at their limb: there is no pericarpium, but the cup, which is ſcaly, contains ſolitary, oblong, compreſſed ſeeds crowned with a ſeſſil down.

PTERYGOIDE, ſomething reſembling a wing; from a reſemblance to which, four apophyſes or proceſſes of the os ſphenoides have been called pterygoide. See the article SPHENOIDES.

PTERYGOIDÆUS, in anatomy, the name of two muſcles of the lower jaw, one internal and the other external. The internal pterygoidæus muſcle has its origin in the cavity of the peterygoide proceſs, and its termination is in the interior and lower ſuperficies of the angle of the jaw. The external pterygoidæus ariſes from the exterior lamina of the ſame proceſs, and terminates a little above the inſertion of the other.

There are alſo ſeveral pairs of muſcles of the pharynx and uvula, as the pterygo-pharyngæus, and pterigo-ſtaphylinus, which have got their names from being connected by the ſame proceſs. The pterygo-ſtaphylinus ariſes from the upper part of the ſaid proceſs, and deſcending between its two lamellæ, turns back its tendon over the thin apophyſis of the interior lamella, as over a pully, to the anterior part of the membrane of the palate, into which it is inſerted, and ſerves to draw the uvula downwards and forwards.

PTISAN, *ϖτισανη*, is properly barley decorticated, or deprived of its hulls, by beating in a mortar, as was the antient practice: though the cooling potion, obtained by boiling ſuch barley in water, and afterwards ſweetening the liquor with liquorice-root, is what at preſent goes by the name of ptiſan; and to render it laxative, ſome add a little ſena, or other herbs of the ſame intention.

PTOLEMAIC, or PTOLEMÆAN *Syſtem of Aſtronomy*, is that invented by Claudius Ptolemæus, a celebrated aſtronomer and mathematician of Peluſium, in Egypt, who lived in the beginning of the IId century of the chriſtian æra.

This hypotheſis ſuppoſes the earth immoveably fixed in the center, not of the world only, but alſo of the univerſe; and that the ſun, the moon, the planets, and ſtars, all move about it, from eaſt to weſt, once in twenty-four hours, in the order following, viz. the Moon next to the earth, then Mercury, Venus, the Sun, Mars, Jupiter, Saturn, the fixed ſtars, the firſt and ſecond cryſtalline heavens, and above all the fiction of their primum mobile. See plate LXXVII. fig. 1. See alſo MOON, &c.

This ſyſtem or hypotheſis was firſt invented, and adhered to, chiefly becauſe it ſeemed to correſpond with the ſenſible appearances of the celeſtial motions. They took it for granted, that the motions which thoſe bodies appeared to have, were ſuch as they truly and really performed: and not dreaming of any motion in the earth, nor being apprized of the diſtinction of abſolute and relative or apparent motion, they could not make a proper judgment of ſuch matters; but were under a neceſſity of being miſled by their ſenſes, for want of the aſſiſtances we now enjoy.

It is eaſy to obſerve, they had no notion of any other ſyſtem but our own, nor of any other world but the earth on which we live. They imagined, that all the fixed ſtars were contained in one concave ſphere, and that the primum mobile was circumſcribed by the empyreal heaven, of a cubic form, which they ſuppoſed to be heaven, or the bliſsful abode of departed ſouls.

It would ſcarce have been worth while to have ſaid ſo much about ſo abſurd an hypotheſis, as this is now well known to be, were it not that there are ſtill numerous retainers thereto, who endeavour very zealouſly to defend the ſame, and that for two reaſons principally, viz. becauſe the earth is apparently fixed in the center of the world, and the ſun and ſtars ſeem to move about it daily; and alſo becauſe the ſcripture aſſerts the ſtability of the earth, the motion of the ſun, &c. But that the diurnal motion of the earth occaſions all theſe appearances, we have abundantly proved under the articles DIURNAL and COPERNICAN; which ſee.

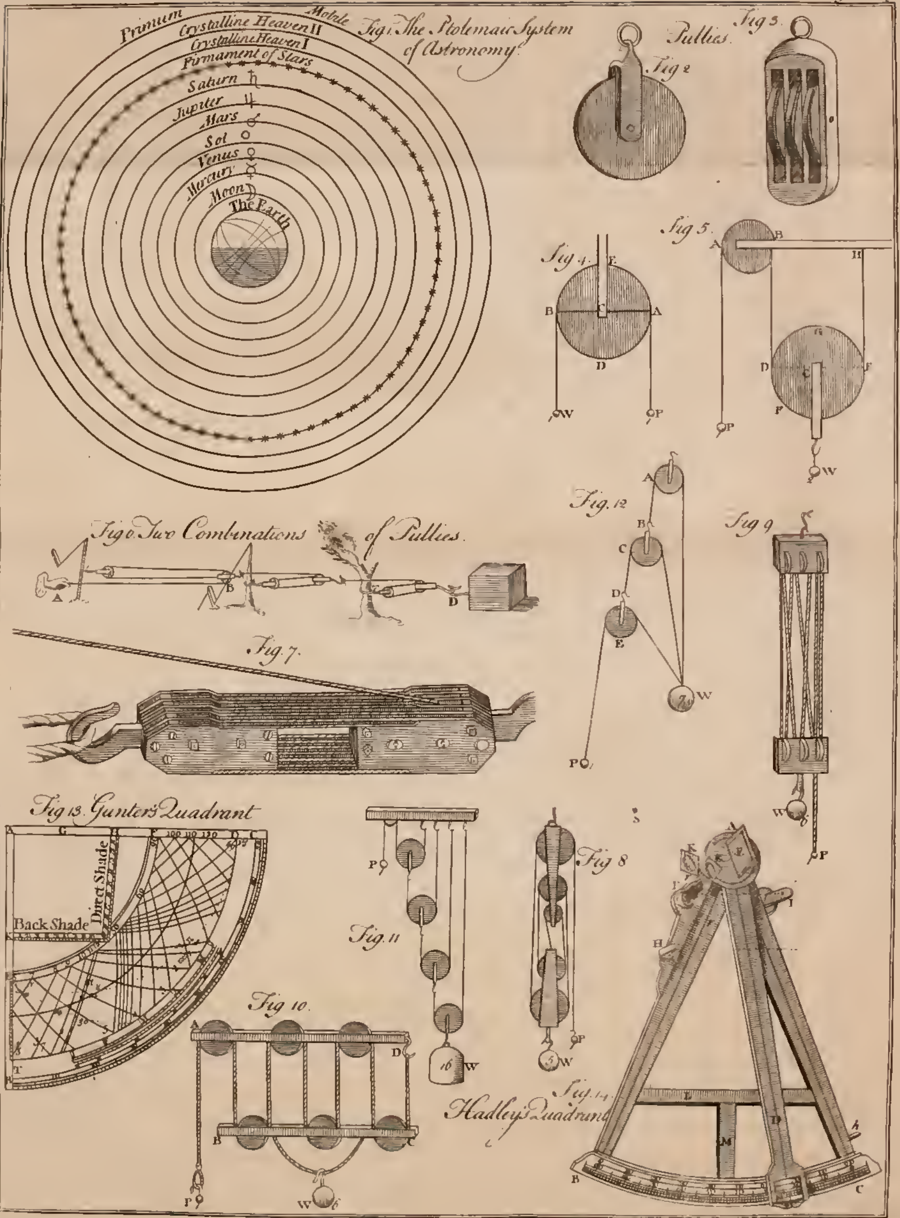
And as to the argument drawn from ſcripture, as it was never intended for an inſtitution of aſtronomy and philoſophy, ſo nothing in it is to be underſtood as ſtrictly or poſitively aſſerted in relation thereto; but only as ſpoken agreeably to the common phraſe, or vulgar notion of things; and thus Sir Iſaac Newton would always ſay, the ſun riſes, ſets, &c. tho' he well knew it was juſt the reverſe in fact; ſince there are divers phænomena of the heavenly bodies, altogether inconſiſtent with, and, in ſome things, exactly contradictory to ſuch an hypotheſis, as has been ſhewn by the arguments adduced to prove the truth of the Copernican ſyſtem. See the article COPERNICAN.

PTYALISM, *ϖτυαλισμος*, in medicine, a ſalivation, or frequent and copious diſcharge of ſaliva.

PUBERTY, *Pubertas*, among civilians, &c: the

PLATE LXXVII.

Facing Pulley



J. Lodge sculp.

the age wherein a perſon is capable of procreation, or begetting children.

Boys arrive at puberty at fourteen years of age, and girls at twelve: eighteen years of age is accounted full puberty.

PUBES, among anatomiſts, &c. denotes the middle part of the hypogaſtric region of the abdomen, lying between the two inguina, or groins. See the article ABDOMEN.

PUBLICAN, *Publicanus*, among the Romans, one who farmed the taxes and public revenues.

PUBLICATION, *Publicatio*, the act of making a thing known to the world; the ſame with promulgation.

PUCELLAGE, *Pucellagium*, or *Puellagium*, denotes the ſtate of virginity. See the article VIRGINITY.

PUCERON, *Podura*, in zoology, a genus of wingleſs inſects, with fewer than ſix pair of legs. The body is ſhort and roundiſh; the tail is crooked and forked; the legs are three pair, and ſerve only for walking; and the eyes are two, but each compoſed of eight leſſer ones.

PUDENDA, the parts of generation in both ſexes. See the article GENERATION.

PUGIL, *Pugillus*, in phyſic, &c. ſuch a quantity of flowers, ſeeds, or the like, as may be taken up between the thumb and two fore-fingers.

It is eſteemed to be the eighth part of the manipule or handful.

PUISNE, or PUNY, in law, one younger born. It is not only applied to the ſecond, third, fourth, &c. child, with regard to the firſt-born; but to the third with regard to the ſecond, &c. The laſt of all is called cadet.

It is alſo applied to a judge, or counſellor, who is in ſome reſpect inferior to another.

PULLEY, *Trochlea*, in mechanics, one of the mechanical powers, called by ſeamen a tackle. See the articles TACKLE and POWER.

When a little wheel, commonly called a ſheave, or ſheever, is ſo fixed in a box or block, as to be moveable round a center-pin, paſſing through it, ſuch an inſtrument is called a pulley. (See plate LXXVII. *fig.* 2) And ſometimes, though improperly, a box or block with ſeveral ſheevers in it, is alſo called a pulley, as that repreſented *fig.* 3. The firſt of theſe is, by workmen, called a ſnatch-block.

A rope going round one or more pullies, in order to raiſe a weight, is called the running-rope; and when a block and its ſheevers is ſo fixed, that whilſt it remains immoveable, another block and ſheevers riſes, with a weight hanging at it, ſuch a machine is called a pair of blocks.

If ADBE (*fig.* 4.) be a pulley, upon which hang the weights P, W; then, ſince the neareſt diſtances of the ſtrings AP, and BW, from the center of motion C, are AC and BC, the pulley will be reduced to the lever or balance, AB, with reſpect to its power; and from thence it appears, that ſince $AC = BC$, we ſhall always have $P = W$, for an equilibrium; and, therefore, no advantage in raiſing a weight, &c. can be had from a ſingle pulley.

In a combination of two pullies, AB, and DFEG (*fig.* 5.) the power is doubled; for the pulley DFEG is reducible to the lever ED, which muſt be conſidered as fixed in the point E, to the immoveable ſtring HE; and the power acting at D is equal to P; and the weight W is ſuſtained from the center C of the pulley; but $P : W :: CE : DE$; therefore, ſince $DE = 2CE$, it is $W = 2P$, or $P = \frac{1}{2}W$.

From what has been ſaid, we may deduce the following rule, to know the advantage to be gained by a pair of blocks, let their number of pullies and ſheevers be what they will, viz. as 1 is to the number of ropes, or of the parts of the rope, applied to the lower pullies, ſo is the weight to the power.

Thus, it is evident, that in *fig.* 4. one pound ſuſtains only a weight of one pound; in *fig.* 5. one pound ſuſtains a weight of two pounds; in *fig.* 8. a weight of five pounds; and in *fig.* 9. and 10. one pound raiſes four and ſix pounds. However, it ought to be obſerved, that the above rule is only applicable where the lower pullies riſe altogether in one block, along with the weight; for when they act upon one another, and the weight is only faſtened to the lowermoſt, the force of the power is doubled by each pulley: thus, in *fig.* 11. a power equal to 1 pound will ſuſtain 16 pounds, by means of four pullies; becauſe $1 \times 2 \times 2 \times 2 \times 2 = 16$. Again, in the combination of pulleys (repreſented in *fig.* 6.) if the power at A be 1, that at B is 3, and at D, 27. And with the combination (*fig.* 7.) which conſiſts of 20 ſheevers, five on each pin, one man may raiſe a ton weight.

The force of the pullies may alſo be eaſily ſhewn by comparing the velocities of the power and weight; for it is evident, if the weight W (*fig.* 5.) be raiſed one inch, each ſtring HE, DB, will be ſhortened one inch, and conſequently the ſtring AP, will be lengthened two inches; and ſo P will paſs through twice the ſpace that W does, in the ſame time: conſequently the tackle of pullies, in the form of *fig.* 8, will increaſe the power five times; and that of *fig.* 9. and 10, will increaſe it ſix times.

In the diſpoſition of pullies according to *fig.* 11. it is plain, ſince each pulley has a fixed rope, it muſt be conſidered as a lever of the ſecond ſort, and ſo will double the power of the foregoing pulley; and ſo four pulleys will increaſe the power ſixteen times.

Though the laſt-mentioned form be of the greateſt force from the ſame number of pulleys, yet, if we conſider the ſimplicity, force, and conveniency of the tackle of pullies altogether, none is ſuperior to that in the form of *fig.* 12. where the uppermoſt pulley is fixed, and each has a rope annexed to the weight; its power therefore is thus eſtimated: when the weight W is raiſed one inch, the rope A B will be lengthened as much; and ſo the pulley C will deſcend one inch, by which means the rope C D will be lengthened two inches, and one by the riſing of the weight W; wherefore the pulley E, will deſcend three inches; and thus the rope E P, will be lengthened ſix inches by that means (viz. three on each ſide) alſo, the riſing of the weight will cauſe it to lengthen one inch more, ſo that the power P, goes through ſeven inches, while the Weight W riſes one: therefore P : W : : 1 : 7. And thus you proceed for any other number.

PULMONARIA, lung-wort, in botany, a genus of plants, whoſe flower is monopetalous and funnel-ſhaped; the tube is cylindric and the length of the cup, and the limb is cut into five obtuſe erect patent ſegments, with the chaps pervious; there is no pericarpium, but the cup, which is monophyllous, pentagonal, and perſiſtent, contains four roundiſh obtuſe ſeeds.

The common ſpotted lung-wort grows naturally in woods and ſhady places in Italy and Germany, and is cultivated with us for medicinal uſe: it has a glutinous juice, which helps it to conſolidate and heal ulcerations and eroſions which proceed from acrimony; it is commended in coughs and conſumptions, ſpitting of blood, and the like diſorders of the lungs.

PULMONARY Vessels, in anatomy, are arteries and veins, which carry the blood from the heart to the lungs, and back again from the lungs to the heart.

Pulmonary Consumption. See the article Consumption.

PULP, in pharmacy, the fleſhy and ſucculent part of fruits, extracted by infuſion or boiling, and paſſed through a ſieve.

PULPIT, *Pulpitum*, an elevated place in a church, whence ſermons are delivered: the French give the ſame name to a reading deſk.

PULSATILLA, the paſque-flower, in botany, a genus of plants, whoſe flower conſiſts of a double order of petals; the filaments are numerous, hairy, and topped with erect twin antheræ: there is no pericarpium; but the ſeeds, which are numerous, pointed, and hairy, are diſpoſed in an oblong, capitated receptacle.

The pulſatilla is cultivated in gardens for the ſake of the flower; and is propagated by ſowing the ſeeds in July. It is ſaid to be vulnerary; and the powder of the dried leaves and flowers is a powerful ſternutatory, but it leaves a burning heat behind it that reaches as far as the brain; for this reaſon it is accounted good in ſleepy diſorders.

This genus is comprehended among the anemonies by Linnæus.

PULSE, *Pulſus*, in the animal œconomy, denotes the beating or throbbing of the heart and arteries. See the articles Heart and Artery.

No doctrine has been involved in more difficulties than that of pulſes; ſince, in giving a phiſiological account of them, phyſicians have eſpouſed quite oppoſite ſentiments; whilſt ſome doubt whether the pulſe is owing to the ſyſtole or diaſtole; as alſo, whether the motion of the heart, and arteries, is one and the ſame, for a moment of time. See Systole and Diastole

Pulse is alſo uſed for the ſtroke with which any medium is affected by the motion of light, ſound, &c. through it. See Medium, Light, &c.

Sir Iſaac Newton demonſtrates, that the velocities of the pulſes in an elaſtic fluid medium (whoſe elaſticity is proportionable to its denſity) are in a ratio compounded of half the ratio of the elaſtic force directly, and half the ratio of the denſity inverſely; ſo that in a medium whoſe elaſticity is equal to its denſity, all pulſes will be equally ſwift.

Pulse, *Legumen*, in botany, a term applied to all thoſe grains or ſeeds which are gathered with the hand; in contradiſtinction to corn, &c. which are reaped, or mowed: or it is the ſeed of the leguminous kind of plants, as beans, vetches, &c. but is by ſome uſed for artichokes, aſparagus, &c.

PULSION, the act of driving, or impelling a thing forwards.

PULVERIZATION, *Pulverizatio*, the art of pulverizing, or reducing a dry body into fine powder; which is performed in friable bodies, by pounding or beating them in a mortar, &c. but to pulverize malleable ones, other methods muſt be taken. To pulverize lead, or tin, the method is this: rub a round wooden box all over the inſide with chalk; pour a little of the melted metal nimbly into the box; when, ſhutting the lid, and ſhaking the box briſkly, the metal will be reduced to powder. See the article Granulation.

PULVINATED, in the antient architecture, a a term applied to a frieze which ſwells or bulges out in the manner of a pillow.

PULVIS, a powder. See the article Powder.

The operation of reducing medicines into powder is ſo very ſimple in itſelf, that it requires no other ſkill than having thoſe things which come under its management ſufficiently dry, in order to be ſo divided. In judging of the fitneſs of materials for this treatment, only theſe two conſiderations neceſſarily require our conſideration. The firſt is, whether the things themſelves are thus reducible without any previous management that may hurt their medical virtues? and next, whether their virtues are conveniently preſerved in this form, when reduced into it? Under the firſt of theſe it naturally occurs, that viſcid and oily ſubſtances cannot be thus managed without firſt reducing them to ſome brittleneſs, which cannot be done without drying; if ſuch things, therefore, cannot be ſufficiently dried for triture, without exhaling their better parts, or deſtroying that particular quality for which the ſimple is valued in medicine, as it happens with many ſeeds and gums, they are much better in any other form than this. The other requiſite in this form, relating to the preſervation of things reduced into it, directs not to preſcribe materials therein which are volatile, or will any other way change in the open air. The preparations, intentions, &c. of the ſeveral powders uſed in medicine, may be ſeen under their ſeveral heads. See POWDER.

PULVIS FULMINANS, among chemiſts, a powder ſo called from its ſmart and loud exploſion, when it begins to melt after being placed upon an iron plate over a gentle fire. It is prepared thus: take three ounces of purified nitre, and one ounce of brimſtone, and grind them well together in a mortar; then putting a ſmall quantity, as about half a dram, over the fire, in the manner already mentioned, it will make a great exploſion. The more philoſophical way of accounting for this effect of the pulvis fulminans is, according to Dr. Shaw, by ſuppoſing that the acid ſpirits of the nitre and ſulphur being looſened by the heat, ruſh towards one another, and towards the ſalt of the tartar, with ſo great a violence, as by the ſhock at once to turn the whole into vapour and ſmoke.

PUMICE, in natural hiſtory, a ſlag or cinder of ſome foſſil, originally bearing another form, and only reduced to this ſtate by the action of the fire, though generally ranked by authors among the native ſtones. It is a lax and ſpungy matter, frequently of an obſcure, ſtriated texture in many parts, and always very cavernous and full of holes; it is hard and harſh to the touch, but much lighter than any other body that comes under the claſs of ſtones. It is found in maſſes of different ſizes, and of a perfectly irregular ſhape, from the bigneſs of a pigeon's egg to that of a buſhel. We have it from many parts of the world, but particularly from about the burning mountains Ætna, Veſuvius, and Hecla, by whoſe eruptions it is thrown up in vaſt abundance; and being by its lightneſs ſupported in the air, is carried into ſeas at ſome diſtance by the winds, and thence to diſtant ſhores. The great uſe of pumice among the antients, ſeems to have been as a dentifrice, and at preſent it is retained in the ſhops on the ſame account.

PUMMEL. See the article POMMEL.

PUMP, *Antlia*, in hydraulics, a machine formed on the model of a ſyringe, for raiſing water. See the article SYRINGE.

The theory of pump-work depends, in a great meaſure, upon the properties of the inverted ſyphon: thus, let A B C D E F G (plate LXXVII. *fig.* 12.) repreſent an inverted ſyphon, A B C D a column of air, and D G the lower part of the pipe of a pump, immerſed in the water of the well H I. Let P be the piſton of the pump at E in its loweſt ſituation, and at F in its higheſt. Now, as both theſe parts communicate with the water, one by preſſing on it, the other by opening into it, they may be looked upon as communicating with one another.

Wherefore, A B C D (the column of air) would by its weight or preſſure force up a column of water into the pipe D G to the height of thirty-two feet, were the air exhauſted from the ſaid pipe, and continued to that height; ſince the weight of a column of air is equal to that of ſuch a column of water of the ſame baſe. If, therefore, the piſton P be thus thruſt down to E, meeting the water there, and from thence it be raiſed to F with an uniform motion, the water will riſe from E to follow the piſton with a variable motion; the leaſt of which is as $\sqrt{AC-DE}$, and the greateſt as $\sqrt{AC-DE}=\sqrt{AE}$.

If in lifting up the piſton, the velocity of the water be leſs than that of the piſton, it will not be able to follow it; but will leave a ſpace between them, which will increaſe more and more as the velocity of the water becomes leſs than that of the piſton. The conſequence of this will be, that a part of the ſtroke of the piſton will be loſt; and not only that, but the piſton, when the water leaves it, will riſe very hard, as having a weight of water upon it, and the air of greater denſity above than below; whence the equilibrium, which ought to be in pumps, is deſtroyed, and the balance againſt the workman.

Now as this can happen even where the diameter of the ſucking-pipe is equal to that of the pump-barrel, it muſt happen much ſooner when the ſucking-pipe is leſs than the barrel; becauſe the water riſing thro' a leſs paſſage, will be longer in filling the pump-barrel, and conſequently muſt quit the piſton, and leave the greater void ſpace between. On the contrary, if the leaſt velocity of the water, riſing into the pipe, be greater than that of the piſton, there will be no void ſpace; and the pump-barrel may be made in proportion as much wider than the ſucking-pipe, as the velocity of the water is greater than that of the piſton.

Now, that this may be the caſe, we ſhall ſhew by calculation what diameters the barrel and pipe ought to have, compared with the velocity of the water and piſton.

Let A repreſent the leaſt altitude of the atmoſphere $AC = 31$ feet of water; $B = DF$ the higheſt elevation of the piſton above the ſurface of the water H I, which let be 16 feet. And let the greateſt velocity of the piſton which can well be given to a pump be that of four feet in a ſecond $= v$; and $V =$ the leaſt velocity of the water that riſes in the pipe; $D =$ the diameter of the barrel; and $d =$ the diameter of the pipe.

Now here we have $\sqrt{A} - \sqrt{B} = V =$ the leaſt velocity of water; and the fall which will produce that velocity is the ſquare of that expreſſion, viz. $A+B-2\sqrt{AB}$, that is, $31+16-2\sqrt{31\times 10}$ = 2 feet 6 inches, the height of the fall required. Whereas, by the common way of taking the ſquare of $\sqrt{A-B}$, viz. $A-B$ for the height, we have 15 feet for the fall, which extraordinary error muſt be of very bad conſequence in practice.

Here the velocity $\sqrt{A}-\sqrt{B}=\sqrt{31}-\sqrt{16}=5{,}6-4=1{,}6$ per ſecond. The velocity of the water, at the bottom of the pipe D, is as $\sqrt{A}=5{,}6$; that alſo muſt be the velocity of the piſton at D, that the water may follow it; whence the piſton moving with the ſame velocity at F, where the velocity is but 1,6, we have $5{,}6-1{,}6=4$ feet of void ſpace; therefore 4 parts in 5,6 of ſuch a ſtroke would be loſt or ineffectual. We may here obſerve, by the way, that ſince the velocity of the water at D is 5,6, and the greateſt velocity which can be given to the piſton (without damaging the machinery) is but 4; therefore a piſton, working at the lower end of the pipe or barrel, will always have water more than enough to prevent any void ſpace or loſs of labour.

But, ſince we find ſo great a void in the pipe at F, of the ſame diameter with the piſton, it is evident, if we contract all the part below F into a ſmall pipe at *FD*, and let the part F G remain as it was for the barrel for the piſton to play in, as at *FG*, that then the water will riſe into the barrel *FG* with a greater velocity than before, in proportion as the pipe is leſs; conſequently, if the bore of the pipe *FD* be to that of the barrel *FG*, as the velocity of the piſton P, or the water in the barrel, is to the velocity of the water in the pipe, there will always be a ſufficiency of water to prevent a vacuum in the barrel. Which rule in ſymbols is thus expreſſed, $DD:dd::V:v$; whence $D^2v=d^2V$ for a general canon; any three of which quantities being given, the fourth may be found. Thus, for example, ſuppoſe D, v, and V, were given to find d, we have $d=\frac{D\sqrt{v}}{\sqrt{V}}$.

Let the diameter of the barrel $D=6$ inches; and ſuppoſe the piſton gives 20 ſtrokes in a minute, each a two feet ſtroke, ſpending as much time in its aſcent as deſcent; then will the motion of the piſton be 80 feet per minute, or $1\frac{1}{3}$ per ſecond; whence, $v=1\frac{1}{3}$. Laſtly, to obtain the value of V, we muſt fix on the length of the pipe *FD*, which let be 16 feet; then the higheſt elevation of the piſton will be 18 feet (if it comes to the bottom of the barrel, as it ought to do); wherefore, a height of water of 18 feet in the pump *GD*, acts againſt the weight or height of 31 feet in the leg AC. Now, the velocity V of the water in the pipe *FD* being uniform, or conſtantly the ſame, we muſt find what difference of uniform velocities will be generated by falls from 31 and 18 feet heights. Thus $\sqrt{16\frac{1}{9}}:32::\sqrt{31}:43$ nearly; and $\sqrt{16\frac{1}{4}}:32::\sqrt{18}:32\frac{3}{4}$; whence the difference of theſe uniform velocities will be $43-32\frac{3}{4}=10\frac{1}{4}=10$ feet three inches per ſecond; therefore $V=10\frac{1}{4}$. Wherefore $\frac{D\sqrt{v}}{\sqrt{V}}=d=2\frac{1}{10}$ inches of the diameter of the pipe *FD*.

The reaſon why we make no uſe of the expreſſion $\sqrt{AB}-\sqrt{DF}$ in this caſe, is, becauſe this gives only the difference of the inſtantaneous velocities, or the leaſt velocity with which the water at F can begin its motion upwards; whereas we here want to find what the conſtant and uniform motion of the water will be, or how much it will ſupply every ſecond uniformly, which is done by the method above. For, ſince a fall of $16\frac{1}{9}$ gives an uniform velocity of 32 feet per ſecond, a fall of 31 feet will give 43; thus a fall of 18 feet will give $32\frac{3}{4}$, and their difference muſt be that of the water at F.

If we know the velocity of the piſton v, the diameter of the barrel D, and the diameter of the pipe d, we ſhall find the velocity of the water in the pipe $V, =\frac{vDD}{dd}$; or thus in words, multiply the ſquare of the diameter of the barrel by the velocity of the piſton; divide the product by the ſquare of the diameter of the pipe, the quotient will be the velocity ſought from the water in the pipe. This velocity, when found, muſt be taken from 43, the remainder $43-V$, will be the uniform velocity produced by a fall from the higheſt ſituation of the piſton to the loweſt ſurface of the water in the well, and which is found by ſaying, as $32:\sqrt{16\frac{1}{9}}::43-V:\sqrt{DF}$; whence DF, the higheſt elevation of the piſton, will be known.

When we know D, V, and d, we find v the velocity of the piſton by this theorem $\frac{Vdd}{DD}=v$; that is, in words, multiply the ſquare of the diameter of the pipe by the velocity of the water in it, and divide the product by the ſquare of the diameter of the barrel, the quotient is the velocity of the piſton required.

Having given the velocity of the water in the pipe V, the diameter of the pipe d, the velocity of the piſton v, to find the diameter of the barrel D, we have this theorem $D=\sqrt{\frac{Vdd}{v}}$; that is, multiply the ſquare of the diameter of the pipe by the velocity of its water, and divide that product by the velocity of the piſton; the ſquare root of the quotient is the diameter of the barrel ſought.

PUN, or PUNN, a conceit ariſing from the uſe of two words that agree in ſound, but differ in the ſenſe. Ariſtotle deſcribes two or three kinds of puns among the beauties of good writing, and produces inſtances of them out of ſome of the greateſt authors.

authors in the Greek tongue. Cicero has ſprinkled ſeveral of his works with puns; and in his book, where he lays down the rules of oratory, quotes abundance of ſayings, which he calls pieces of wit, that upon examination prove perfect puns.

PUNCH, an inſtrument of iron or ſteel, uſed in ſeveral arts, for the piercing or ſtamping holes in plates of metals, &c. being ſo contrived as not only to perforate, but to cut out and take away the piece.

PUNCHEON, Punchin, or Punchion, a little block or piece of ſteel, on one end whereof is ſome figure, letter or mark, engraven either in creux or relievo, impreſſions whereof are taken on metal, or ſome other matter, by ſtriking it with a hammer on the end not engraved. There are various kinds of theſe puncheons uſed in the mechanical arts; ſuch for inſtance are thoſe of the goldſmiths, cutlers, pewterers, &c.

Puncheon, is alſo uſed for ſeveral iron-tools of various ſizes and figures, uſed by the engravers in creux on metals. Seal-gravers particularly uſe a great number for the ſeveral pieces of arms, &c. to be engraven, and many ſtamp the whole ſeal from a ſingle puncheon.

Puncheon, is alſo a common name for all thoſe iron inſtruments uſed by ſtone-cutters, ſculptors, black-ſmiths, &c. for the cutting, inciding, or piercing their ſeveral matters.

Puncheon, in carpentry, is a piece of timber placed upright between two poſts, whoſe bearing is too great, ſerving, together with them, to ſuſtain ſome large weights.

Puncheon, is alſo uſed for the arbor, or principal part of a machine, whereon it turns vertically, as that of a crane, &c.

Puncheon, is alſo a meaſure for liquids, containing an hogſhead and one third, or eighty-four gallons.

PUNCTATED Hyperbola, an hyperbola whoſe oval conjugate is infinitely ſmall, i. e. a point.

PUNCTUATION, in grammar, the art of pointing or of dividing a diſcourſe into periods, by points, expreſſing the pauſes to be made in the reading thereof. See the article Point.

PUNCTUM, in geometry, &c. See the article Point.

Punctum Saliens, in anatomy, the firſt rudiments of the heart in the formation of the fœtus, where a throbbing motion is perceived. This is ſaid to be eaſily obſerved with a microſcope in a brood egg, wherein, after conception, we ſee a little ſpeck or cloud, in the middle whereof is a ſpot that appears to beat or leap a conſiderable time before the fœtus is formed for hatching. See the article Fœtus

PUNCTURE, in ſurgery, any wound made by a ſharp pointed inſtrument.

PUNICA, the Pomegranate-Tree, in botany. See the article Pomegranate.

PUNISHMENT, in law, the penalty which a perſon incurs on the breach or tranſgreſſion of any law.

PUNITORY Interest, in the civil law, ſuch intereſt of money as is due for the delay of payment, breach of promiſe, &c.

PUPIL, *Pupillus*, in the civil law, a boy or girl not yet arrived at the age of puberty, i. e. the boy under fourteen, years the girl under twelve.

Pupil is alſo uſed in univerſities, &c. for a youth under the education or diſcipline of any perſon.

Pupil, *Pupilla*, in anatomy, a little aperture in the middle of the uvea and iris of the eye, through which the rays of light paſs to the cryſtalline, in order to be painted on the retina, and cauſe viſion.

The ſtructure of the uvea and iris, is ſuch as that by their aperture the pupil is contractible and dilatible at pleaſure, ſo as to accommodate itſelf to objects, and to admit more or fewer rays; as the object, being either more vivid and near, or more obſcure and remote, requires more or leſs light: it being a conſtant law, that the more luminous the object is, the ſmaller the pupil; and again, the nearer the object, the ſmaller the pupil; and *vice verſa*. This alteration of the pupil is effected by certain muſcular fibres on the outſide of the uvea, which arrive from the nerves detached hither from the ſclerotica: ſome others attribute the motions of the pupil to the ligamentum ciliare; and others think that both this and the fibres of the uvea concur herein.

There is a diſeaſe of the eyes called a contraction of the pupil, wherein there is ſuch a total or cloſe contraction of that part, that it will not tranſmit light enough to the bottom of the eye, to enable the patient to ſee objects diſtinct; ſometimes this diſorder is from infancy, and ſometimes it ariſes from an intenſe inflammation of the eye. The cure of this is extremely difficult; but Mr. Cheſelden has invented a method by which he has often proved very ſucceſsful in his attempts to relieve it. The method is this: the eye-lids being held open by a ſpeculum oculi, he takes a narrow ſingle edged ſcalpel, or needle, almoſt like that uſed in couching for the cataract, and paſſing it through the ſclerotica, as in couching, he afterwards thruſts it foreward through the uvea, or iris, and in extracting cuts it open through the iris. See the article Couching.

PURCHASE, in law, the buying or acquiring of lands, &c. with money, by deed or agreement, and not by deſcent or right of inheritance.

Purchase, in the ſea-language, is the ſame as draw in: thus when they ſay the capſtan purchaſes a-pace, they only mean it draws in the cable a-pace.

PURE, ſomething free from any admixture of foreign or heterogeneous matters: thus we ſay pure fire, &c. See the article FIRE, &c.

PURE HYPERBOLA, in conics, is an hyperbola without any oval, nodes, ſpike, or conjugate point.

PURFLEW, a term in heraldry, expreſſing ermins, peans, or any of the furs, when they compoſe a bordure round a coat of arms: thus they ſay, he beareth gules a bordure, purflew, vairy: meaning that the bordure is vairy.

PURGATION, the art of purging, ſcouring, or purifying a thing, by ſeparating or carrying off any impurities found therein.

PURGATIVE, or **PURGING MEDICINES**, a medicament which evacuates the impurities of the body by ſtool, called alſo cathartics.

We have had attempts of adjuſting the doſes of purgative medicines ſcientifically. Dr. Cockburn endeavoured at the ſolution of this problem, but, it is ſaid upon wrong principles. Dr. Balguy, in the Medical Eſſays of Edinburgh, has alſo given us an eſſay on this ſubject. He aſſumes, that part of the medicines is ſpent on the firſt paſſages, where it acts as a ſtimulus; and that the other part is carried into the blood, and has its effects there by thinning and rarifying it. This being premiſed, 1. If the medicine acts only in the firſt paſſages, the doſe will be as the ſize of the perſon into the conſtitution. 2. If the whole medicine paſſes into the blood, the doſe will be as the ſize into the ſquare of the conſtitution; and, therefore, 3. You are to doſe ſo much of the medicine as is ſpent on the ſtomach and inteſtines directly as the conſtitution, and ſo much as is carried into the blood as the ſquare of the conſtitution; and the ſum into the perſons ſize, is the quantity required. The ſame rules hold in vomits. How far in either caſe the practice of phyſic may be thereby improved, we leave to the judgment of the learned. The ſolution of the problem ſuppoſes a great poſtulatum, no leſs than the art of meaſuring a perſon's conſtitution.

PURGATORY, a place in which the juſt, who depart out of this life, are ſuppoſed to expiate certain offences which do not merit eternal damnation.

Broughton has endeavoured to prove, that this notion has been held by Pagans, Jews, and Mahometans, as well as Chriſtians.

The doctrine of purgatory is a very lucrative article to the clergy of the Romiſh church, who are very liberally paid for maſſes and prayers for the ſouls of the deceaſed. We are told by ſome of their doctors, that purgatory is a ſubterraneous place, ſituated over the hell of the damned, where ſuch ſouls as have not yet made ſatisfaction to divine juſtice for their ſins, are purged by fire, after a wonderful and incomprehenſible manner: and here they are purified from thoſe dregs which hinder them from entering into their eternal country, as the catechiſm of the council of Trent expreſſes it.

PURGE, in medicine, the ſame with cathartic. See the article CATHARTIC.

PURIFICATION, in matters of religion, a ceremony which conſiſts in cleanſing any thing from a ſuppoſed pollution or defilement.

The Pagans, before they ſacrificed, uſually bathed or waſhed themſelves in water, and they were particularly careful to waſh their hands, becauſe with theſe they were to touch the victims conſecrated to the gods. It was alſo cuſtomary to waſh the veſſel with which they made their libations. The Mahometans uſe purifications as previous to the duty of prayer; theſe alſo are of two kinds, either bathing, or only waſhing the face, hands and feet. The firſt is requeſted only in extraordinary caſes, as after having lain with a woman, touched a dead body, &c. But leſt ſo neceſſary a preparation for their devotions ſhould be omitted, either where water cannot be had, or when it may be of prejudice to a perſon's health, they are allowed in ſuch caſes to make uſe of fine ſand, or duſt inſtead of it; and then they perform this duty by clapping their open hands on the ſand, and paſſing them over the parts, in the ſame manner as if they were dipped in water.

There were alſo many legal purifications among the Hebrews. When a woman was brough to bed of a male child, ſhe was eſteemed impure for forty days; and when of a female, for ſixty; at the end of which time ſhe carried a lamb to the door of the temple, to be offered for a burnt-offering, and a young pigeon or turtle for a ſin-offering, and by this ceremony ſhe was cleanſed or purified. For other purifications of the Jews, ſee the article IMPURITY.

Among the Romaniſts, the holy water is uſed by way of purification.

PURIFICATION *of the bleſſed Virgin*, a feſtival of the chriſtian church, obſerved on the ſecond of February, in memory of the purification of Chriſt in the temple, and his mother's ſubmitting to the Jewiſh law of purification after the birth of a male child.

PURIFICATION, in chemiſtry, the act of purifying or refining natural bodies by ſeparating the fæces and impurities from them. For the method of purifying metals, ſee the article REFINING, &c.

For the purification of ſemi-metals, ſee the arcles ANTIMONY, SULPHUR, &c.

PURIM, or *the Feaſt of Lots*, a ſolemn feſtival of the Jews, inſtituted in memory of the deliverance they received from Haman's wicked attempt to deſtroy them by means, of Mordecai and Eſther.

PURITAN, a name formerly given in deriſion to the diſſenters from the church of England, on account of their profeſſing to follow the pure word of God, in oppoſition to all traditions and human conſtitutions. See the articles INDEPENDENTS, PRESBYTERIANS, &c.

PURLINS, in building, thoſe pieces of timber that lie acroſs the rafters on the inſide, to keep them from ſinking in the middle of their length.

PURLUE, or PURLIEU, ſignifies all that ground near any foreſt, which being made foreſt by king Henry II. Richard I. and king John, was afterwards by perambulations and grants of Henry III. ſevered again from the ſame, and made purlieu; that is to ſay, pure and free from the laws of the foreſt.

The owners of grounds within purlieus, may convert paſture into arable, &c. as alſo incloſe them with any kind of incloſures, or erect edifices upon them, and may diſpoſe of the ſame as if they had never belonged to the foreſt: hence if the wild beaſts chance to wander out of the foreſt into the purlieu, the king has ſtill a property in them, againſt every man except the owner of the ground in which they are who had a ſpecial property in them *ratione ſoli*; yet ſo far as he may take them by hunting with his greyhounds or dogs, without any fore ſtalling or foreſetting them in their courſe again towards the foreſt.

PURLUE-MAN, or PURLIEU-MAN, a perſon who has ground within the purlieu, and is qualified to hunt within the ſame though under certain reſtrictions.

PURPLE, a colour compoſed of a mixture of red and blue.

PURPLE FEVER, the ſame with miliary fever. See MILIARY FEVER.

PURPURA, in natural hiſtory, a genus of ſimple ſhells, having no hinge, formed of one contiguous piece, and covered from the top to the bottom with ſpines, tubercles, and umbos; the mouth is ſmall, and approaches to a round figure: the clavicle is ſhort, but the other extremity is uſually protended to a conſiderable length.

PURPURE, POURPRE, or PURPLE, in heraldr, according to ſome, is one of the five colours of armories, compounded of gules and azure, bordering on violet, and, according to others, of a great deal of red and a little black. But it was excluded by the ancient heralds as only an imperfect colour. In the coats of noblemen it is called amethyſt; and in thoſe of princes, mercury. It is repreſented in engraving, by diagonal lines drawn from the ſiniſter chief to the dexter baſe point.

PURREL, a liſt ordained by act of parliament to be made at the end of kerſeys, to prevent deceit in diminiſhing their length.

PURSE, a manner of accounting, or a ſpecies of money of account, much uſed in the Levant.

PURSER, an officer aboard a man of war, who receives her victuals from the victualler, ſees that it be well ſtowed, and keeps an account of what he every day delivers to the ſteward. He alſo keeps a liſt of the ſhip's company, and ſets down exactly the day of each man's admiſſion, in order to regulate the quantity of proviſions to be delivered out, and that the paymaſter or treaſurer of the navy may iſſue out the diſburſements, and pay off the men, according to his book.

PURSIVENESS, among farriers, is a diſorder in horſes, otherwiſe called broken wind, in which the horſe makes a hiſſing whiſtling ſound in his throat, and has a greater heaving in the flanks than in common colds.

For the cure of this diſorder, Dr. Bracken adviſes, that the horſe ſhould have good nouriſhment, much corn, but little hay; and that every other day the water given him be impregnated with half an ounce of ſaltpetre, and two drams of ſal armoniac.

PURSLAIN, *Portulaca*, in botany. See the article PORTULACA.

PURULENT, in medicine, ſomething mixed with, or partaking of, pus or matter.

PUS, in medicine, a white or yellowiſh putrid matter, formed of corrupted blood, and contained in a wound or ulcer.

PUSTULE, a pimple, or ſmall eruption on the ſkin full of pus; ſuch are the puſtules of the ſmall pox and French pox. See the article POX.

PUTLOGS, or PUTLOCKS, in building, are ſhort pieces of timber about ſeven feet long, uſed in building ſcaffolds. They lie at right angles to the wall, with one of their ends reſting upon it, and the other upon the poles which lie parallel to the ſide of the wall of the building.

PUTREFACTION, a kind of ſlow corruption produced by heat and ſome moiſt fluid, particularly the air and water; which, penetrating the pores, diſſolves and ſets at liberty ſome of the more ſubtile parts, particularly the ſalts and oils, and thus looſens the compages, and changes the texture of bodies.

PUTRID, ſomething rotten, or putrified.

PUTTY, the ſame with ſpodium. See the article SPODIUM.

PUTTY, in its popular ſenſe, is a kind of paſte compounded of whiting and linſeed oil, beaten together to the conſiſtence of a thick dough.

It is uſed by glaziers for the faſtening in the ſquares of glaſs in ſaſh-windows, and by painters for ſtopping up the crevices and clefts in timber and wainſcots, &c.

PUTTY ſometimes alſo denotes the powder of calcined tin, uſed in poliſhing and giving the laſt gloſs to works of iron and ſteel.

PYCNOSTYLE, in the antient architecture, is a building where the columns ſtand very cloſe to each other; only one diameter and a half of the column being allowed for the intercolumniations.

According to Mr. Evelyn, the pycnoſtyle chiefly belonged to the Compoſite order, and was uſed in the moſt magnificent buildings; as at preſent in the periſtyle at St. Peter's at Rome, which conſiſts of near three hundred columns; and in ſuch as yet remain of the antients, among the late diſcovered ruins of Palmyra.

PYCNOTICS, the ſame with incraſſants. See the article INCRASSATING.

PYGME, the ſame with cubit. See the article CUBIT.

PYGMY, a perſon not exceeding a cubit in height.

This appellation is given by the antients to a fabulous nation ſaid to have inhabited Thrace; who brought forth young at five years of age, and were old at eight; theſe were famous for the bloody war they waged with the cranes.

PYLORUS, in anatomy, the right or lower orifice of the ſtomach, which is connected with and opens into the inteſtines. See the articles STOMACH and INTESTINES.

PYONY, or PIONY. See PIONY.

PYRACANTHA, in botany, a ſpecies of meſpilus; this is an ever-green plant; it grows naturally in the hedges in the ſouth of France and Italy: the branches are ſlender, covered with a dark brown bark, and armed with a few long thorns: the leaves are oval, of a lucid green, ſmooth, and ſlightly indented on their edges; the flowers are roſaceous, and come from the ſide of the branches in large umbels, and are of a dirty white colour; they are ſucceeded by roundiſh umbilicated berries, which ripen in winter, and are of a fiery red colour, which being intermixed with the green leaves, make a fine appearance at that ſeaſon of the year. This plant is either propagated by ſeeds or layers, and with us is generally planted againſt walls or buildings, as the ſtalk and branches are too ſlender and weak to ſtand without ſupport.

PYRAMID, πυραμις, in geometry, a ſolid ſtanding on a triangular, ſquare, or polygonal baſis, and terminating in a point at the top; or, according to Euclid, it is a ſolid figure, conſiſting of ſeveral triangles, whoſe baſes are all in the ſame plane and have one common vertex.

Hence the ſuperficies of a given pyramid is eaſily found by meaſuring theſe triangles ſeparately; for their ſum added to the area of the baſe, is the ſurface of the pyramid required.

It is no leſs eaſy to find the ſolid content of a given pyramid; for the area of the baſe being found, let it be multiplied by the third part of the height of the pyramid, or the third part of the baſe by the height, and the product will give the ſolid content, as is demonſtrated by Euclid, lib. 12. prop. 7.

If the ſolid content of a fruſtum of a pyramid is required, firſt let the ſolid content of the whole pyramid be found; from which ſubtract the ſolid content of the part that is wanting, and the ſolid content of the fruſtum, or broken pyramid, will remain. See FRUSTUM.

PYRAMID, in architecture, a ſolid maſſive building, which from a ſquare, triangle, or other baſe, riſes diminiſhing to a vertex or point.

Pyramids are ſometimes uſed to preſerve the memory of ſingular events; and ſometimes to tranſmit to poſterity the glory and magnificence of princes. But as they are eſteemed a ſymbol of immortality, they are moſt commonly uſed as funeral monuments. Such is that of Ceſtius at Rome, and thoſe other celebrated ones of Egypt, as famous for the enormity of their ſize, as their antiquity. Theſe are ſituated on the weſt ſide of the Nile almoſt oppoſite to Grand Cairo; the baſe of the largeſt covers more than ten acres of ground, and is, according to ſome, near ſeven hundred feet high, though others make it ſix hundred, and ſome but little more than five hundred. The pyramid is ſaid to have been, among the Egyptians, a ſymbol of human life; the beginning of which is repreſented by the baſe, and the end, by the apex; on which account it was that they uſed to erect them over ſepulchres.

PYRAMIDAL, ſomething relating to a pyramid. See the preceding article.

PYRAMIDAL NUMBERS. See NUMBER.

PYRAMIDALIA CORPORA, in anatomy, the two protuberances of the medulla oblongata. The ſpermatic veſſels are alſo by ſome authors thus termed.

PYRAMIDALIS, in anatomy, a ſmall muſcle in the abdomen lying in the lower part of the rectus. It has its name from its figure, and its origin from the margin of the os pubis, with a broad fleſhy head, whence it grows gradually narrower, till it ends in a ſmall round tendon in the linea alba, ſometimes almoſt at the navel. This muſcle is ſometimes ſingle, ſometimes it has its fellow, and in ſome ſubjects they are both wanting.

Pyramidalis is alſo the name of one of the dilatores, or muſcles which ſerve to turn up the noſe. This muſcle riſes at the foot of the noſe, and is uſually contiguous with the frontalis. It deſcends along the ſide of the noſe, where it is by degrees a little expanded. It is inſerted into the alæ of the noſe, and often ſends down its fibres as far as the upper lip.

PYRAMIDOID, the ſame with the parabolic ſpindle.

PYRENOIDES PROCESSUS, in anatomy, a proceſs of the ſecond vertebra of the neck, called alſo odontoides, and dentiformis.

PYRETHRUM, in the materia medica, the root of a ſpecies of the buphthalmum, called, among us, pellitory of Spain. See the article BUPHTHALMUM.

PYRFORMIS, in anatomy, a muſcle of the thigh, receiving its name from its figure, which reſembles that of a pear. It riſes thick from the lower part of the os ſacrum, where it is joined to the ileum; from thence it runs tranſverſely towards the joint of the hip, and terminates in a ſhort tendon, which is inſerted in the middle of the internal labium of the great trochanter, by two or three branches.

PYRITES, in natural hiſtory, a name uſed by Dr. Hill for a claſs of compound inflammable metallic bodies found in detached maſſes, but of no determinately angular figure. This claſs the Dr. divides into two orders, the firſt of which, being thoſe pyritæ of a plain and ſimple internal ſtructure, comprehends two genera: the firſt genus, termed pyriplaces, are thoſe pyritæ of a ſimple internal ſtructure, and covered with an inveſtient coat or cruſt; the ſecond genus, termed gymnopyres, are thoſe pyritæ of a ſimple internal ſtructure, and not covered with a cruſt; the ſecond order, being thoſe pyritæ of a regularly ſtriated internal ſtructure alſo, comprehends two genera, the firſt termed pyritricha are thoſe pyritæ of a ſimply ſtriated texture; the ſecond genus, called pyritrichiphylla, are thoſe pyritæ whoſe ſtriæ terminate in foliaceous ends.

This foſſile is recommended by ſome authors as an emmenagogue, but it is ſcarce ever preſcribed with this intention; the common green vitriol, or copperas of the ſhops, is made from it; and an acid ſomewhat different from that of pure vitriol may be drawn off from it by the retort, after it has been expoſed to the air till it moulders away: this is of great uſe in mineralogy, and is a ſolvent for ſeveral foſſils that none of the other acids will touch.

PYROLA, winter-green, in botany, a genus of plants, whoſe flower cup is ſmall, perſiſtent, and cut into five parts; the corolla conſiſts of five roundiſh concave patent petals; the ſtamina are ten ſubulated filaments, terminating with large noding antheræ with two riſing horns. The fruit is a roundiſh, depreſſed, pentagonal capſule, with five cells open at the angles, which are filled with many chaffy ſeeds.

The greater round-leaved pyrola grows naturally in the north of England, on mountainous and woody places, and flowers in June and July: it is reckoned to be aſtringent and vulnerary, and proper to ſtop internal bleedings being taken in the manner of tea.

PYROTECHNY, ϖυροτεχνια, the art of fire, or a ſcience which teaches the management and application of fire, in ſeveral operations. Pyrotechny is of two kinds, military and chemical: military pyrotechny is the doctrine of artificial fire-works and fire-arms, teaching the ſtructure and uſe of thoſe uſed in war, the attacking of fortifications, &c. as gun-powder, cannons, bombs, granadoes, carcaſſes, mines, fuſees, &c. and thoſe made for amuſement's ſake, as rockets, ſtars, ſerpents, &c. See the articles GUN-POWDER, CANNON, &c.

Chemical pyrotechny is the art of managing and applying fire in diſtillations, calcinations, and other operations of chemiſtry.

PYROTICS, ϖυρωτικα, in medicine, cauſtics, or remedies, either actually or potentially hot; and which accordingly will burn the fleſh, and raiſe an eſchar. See the article CAUSTICS.

PYRRHICHA, ϖυρριχη, in antiquity, a kind of exerciſe on horſeback, or a feigned combat, for the exerciſe of the cavalry.

PYRRHICHIUS, in the Greek and Latin poetry, a foot conſiſting of two ſyllables, both ſhort, as *Deus*. See FOOT.

PYRRHONIANS, PYRRHONEANS, or PYRRHONISTS, a ſect of antient philoſophers, ſo called from Pyrrho, a native of Elis, in Peloponneſus. The opinions of theſe philoſophers, who were alſo called ſceptics, terminated in the incomprehenſibility of all things, in which they found reaſon both for affirming and denying; accordingly they ſeemed, during their whole lives, to be in ſearch of truth, without ever acknowledging that they found it: hence the art of diſputing upon all things, without ever going farther than ſuſpending our judgments, is called pyrrhoniſm.

Pyrrho maintained, that life and death were equally indifferent; and he is charged with teaching, that honour and infamy, the juſtice and injuſtice of actions, depended ſolely on human laws and cuſtoms; and, in a word, that there is nothing in itſelf honeſt or diſhoneſt, juſt or unjuſt: an abominable doctrine, that opens the way to all manner of crimes.

PYRUS, the pear-tree, in botany. See the article PEAR.

PYTHAGOREANS, a ſect of antient philoſophers, ſo denominated from their being the followers of Pythagoras of Samos, who lived in the reign of Tarquin, the laſt king of the Romans, in the year of Rome 220; or, according to Livy, in the reign of Servius Tullius, in the year of the world 3472.

Pythagoras, from his extraordinary deſire of knowledge, travelled in order to enrich his mind with the learning of the ſeveral countries through which he paſſed. He was the firſt that took the name of philoſopher, that is, a lover of wiſdom, which implied, that he did not aſcribe the poſſeſſion of wiſdom to himſelf, but only the deſire of poſſeſſing it.

His maxims of morality were admirable; for he was for having the ſtudy of philoſophy ſolely tend to elevate man to a reſemblance of the Deity. He believed that God is a ſoul diffuſed through all nature, and that from him human ſouls are derived; that they are immortal, and that men need only take pains to purge themſelves of their vices, in order to be united to the Deity. He made unity the principle of all things; and believed, that between God and man there are various orders of ſpiritual beings, who are the miniſters of the ſupreme being. He condemned all images of the Deity, and would have him worſhipped with as few ceremonies as poſſible. His diſciples brought all their goods into a common ſtock, contemned the pleaſures of ſenſe, abſtained from ſwearing, eat nothing that had life, and believed in the doctrine of a metempſychoſis. See the article METEMPSYCHOSIS.

Pythagoras made his ſcholars undergo a ſevere noviciate of ſilence for at leaſt two years; and it is ſaid, that where he diſcerned too great an itch for talking, he extended it to five: his diſciples were therefore divided into two claſſes, of which the firſt were ſimple hearers, and the laſt ſuch as were allowed to propoſe their difficulties, and learn the reaſons of all that was taught there.

The Pythagoreans, it is ſaid, on their riſing from bed, rouſed the mind with the ſound of the lyre, in order to make them more fit for the actions of the day; and at night reſumed the lyre, in order to prepare themſelves for ſleep, by calming all their tumultuous thoughts.

The figurative manner in which he gave his inſtructions, was borrowed from the Hebrews, Egyptians, and other orientals. Some think he derived his philoſophy from the books of Moſes, and that he converſed with Ezekiel and Daniel at Babylon; but this is mere conjecture.

Some authors ſay, that he left nothing in writing; but Laërtius and others attribute ſeveral treatiſes to him. His golden verſes, attributed by ſome to one of his diſciples, are allowed to be an exact copy of the ſentiments of that divine philoſopher, from whoſe ſchool proceeded the greateſt philoſophers and legiſlators.

PYTHIA, in antiquity, the prieſteſs of Apollo at Delphi, by whom he delivered oracles: ſhe was thus called from the god himſelf, who was denominated Apollo Pythios, from his ſlaying the ſerpent Python.

This prieſteſs was to be a pure virgin; ſhe ſat on the lid of a brazen veſſel, mounted on a tripod or three-legged ſtool; and thence, after a violent enthuſiaſm, delivered her oracles in a few ambiguous and obſcure verſes, or in a ſhort ſentence in proſe. See the article ORACLE.

PYTHIAN GAMES, in antiquity, ſolemn games celebrated near Delphi, in honour of Apollo, and in remembrance of his having killed the ſerpent Python.

Theſe were held every two years, about the month Elaphebolion, which anſwered to our February. The celebration of theſe games was attended with the Pythian ſong, in which was celebrated the fight of Apollo and the ſerpent. The victors were crowned with branches of laurel; though, at the firſt inſtitution, the crown was of beech-leaves. See GAMES.

PYXIDIUM, cup-moſs, in botany, a genus of moſſes, conſiſting of a firm, tough, and flexile matter, formed into the ſhape of hollowed cups, or drinking glaſſes, with longer or ſhorter ſtems.

PYXIS NAUTICA, the ſeaman's compaſs. See COMPASS.

PYXIS, in anatomy, the acetabulum, or cavity of the hip-bone. See the articles ACETABULUM and FEMUR.

THE END OF THE SECOND VOLUME.

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